ANNUAL REPORT

OF THE

DEPARTMENT OF THE INTERIOR

FOR THE

FISCAL YEAR ENDED MARCH 31, 1924

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

To General His Excellency the Right Honourable Lord Byng of Vimy, G.C.B., G.C.M.G., M.V.O., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

The undersigned has the honour to lay before Your Excellency the report of the transactions of the Department of the Interior for the fiscal year ended March 31, 1924.

Respectfully submitted,

CHARLES STEWART,

Minister of the Interior.

OTTAWA, August 30, 1924.

TABLE OF CONTENTS

83305—12—1½

REPORT

OF

DEPARTMENT OF THE INTERIOR

1923-24

Hon. Charles Stewart,
Minister of the Interior,
Ottawa.

Sir,—I have the honour to submit the 51st Annual Report of the Department of the Interior for the fiscal year ended March 31, 1924.

The work of the department has been carried along lines identical with those of previous years, but latterly certain developments have been such as to justify serious study and the widest publicity.

The conversion of water-power into electrical energy has assumed such striking proportions as to focus attention on the influence this peculiarly Canadian achievement will have on the trade, transportation and agriculture of the country. Turbine installation during the year was increased by over one-quarter million horse-power, bringing the current installation to the astounding total of 3,228,000 horse-power, equivalent to over one horse-power for every three people. These figures place Canada in a unique world position and, together with the low cost of most of the developments, give her a profound advantage in the commercial struggle of the immediate future. Hydraulic plants are also stimulating production in isolated districts thereby feeding transportation systems and indirectly providing an adequate home market for agricultural products and many raw materials. The whole standard of living in this country is being immeasurably improved by the hydraulic achievements now being consummated.

Another impressive development is under way as the result of the department's policy of giving access to and at the same time conserving some of the magnificent beauty spots and recreational areas of the Dominion. More than 250,026 tourists visited the National parks during the past season, an increase of sixty thousand over the year before. A large proportion of these were Americans, many with money to invest, all with money to spend. There is every indication that this tide of travel is but commencing and that, as the word is passed along and as highways are extended and improved, the movement will assume proportions that will compare favourably with those to the most famous resorts of world travellers. The Banff-Windermere highway across the Rockies, one of the most scenic and splendid automobile roads ever constructed, was officially opened on June 30 and over 8000 cars passed over it during the season. This is the last link in the five-thousand-mile system of international highways known as the "Grand Circle Tour".

The game sanctuaries are a source of ever-growing fascination to visitors and constitute permanent breeding grounds for the magnificent hunting country by which they are surrounded. It may be interesting to note that, although nearly 2,000 buffalo were commercially slaughtered last year, the natural increase has almost balanced the losses and the total herd now is counted at 6,655.

The economic value of the forests of the Prairie Provinces is becoming increasingly demonstrated as the frontiers of civilization are pushed farther northward. The federal forest reserves show higher revenues than in any previous year, namely, $150,887.37, and there is some reason to hope that further expansion will take place at no remote date as mining operations are extended and a pulp industry introduced. It is also gratifying to record that forest fires were cut in half from those of the previous year which had covered over six hundred thousand acres of federal area. The success of the aeroplane in patrolling inaccessible districts and locating fires in their early stages has now been clearly established and it is hoped that the future will see even more effective organization along these lines. Two important conferences were held during the year, the British Empire Forestry Conference and a joint federal and provincial forest-fire conference convoked by the Minister of the Interior, Ottawa.

The mineralized areas administered by this department are, almost without exception, at a promising and critical stage of their exploitation. The high grade silver-lead ores of the Yukon have been placed on a shipping basis while mill ore is accumulating. In the northern Manitoba gold camps, English interests have done successful pioneer under-ground work. Capital is being interested in the utilization of the natural gas in the isolated section of northern Alberta through the manufacture of carbon black. Drilling for oil in southern Alberta near the Montana boundary has reached a very interesting stage with several indications that important oil-bearing zones are about to be tapped. The total value of the coal produced in Alberta and Saskatchewan last year was over $29,000,000.

Despite the present reputed apathy to land settlement, an area of 614,880 acres was granted during the year under homestead entry bringing the aggregate of lands so held to 54,000,000 acres. Soldier grants were 113,600 acres. National park and forest reserves constitute 25,600,000 acres and the school land endowments 9,300,000 acres. During the year over 1,200 acres of school lands were sold at an average price of $10.19 per acre. The revenue derived from timber, grazing and hay lands was $883,726.90, practically as large as the previous year.

The production of agricultural lands in the semi-arid districts, largely in Alberta, has been stabilized through the completion to date of irrigation works to benefit 1,100,000 acres. Four new districts are prepared to supply water next year. The administration of this service as well as that of drainage work has been made a responsibility of the Director of Water Powers, as a matter of departmental economy.

The International Boundary Commission and the Geodetic and Topographical Surveys have continued their work along regular lines. The Topographical Survey has been giving special attention to the work of land classification and the utilization of aerial photography as an aid to mapping. The scientific achievements of the Dominion Astronomical Observatory, Ottawa, and the Astrophysical Observatory at Victoria have been maintained at the same high standard of previous years. There has been a marked growth in the work of the Forest Research division and the investigational demands upon the Forest Products Laboratories are steadily increasing.

Permanent wireless communication between the Northwest Territories, Yukon, and the outside world has been established and will mean much to the social life of those districts. Arctic exploration was continued during the year and one new post established. To protect the means of subsistence of the natives large game preserves were set aside for their use, and further protection afforded by the imposition of increased fees for hunting and trapping by non-residents.

A number of historic sites were marked with suitable tablets and monuments. Other sites and structures were acquired to be preserved from vandalism and decay.

The increasing demand on the department from abroad for information as to Canada's natural resources clearly reveals the great interest being taken in the opportunities for development which this country offers and gives great promise of future expansion. Information of interest to tourists, especially with regard to fur resources and game laws, is eagerly sought, especially by Americans. Every effort has been made, through the facilities available, to supply sound advice and to prepare accurate statements to meet the needs.

Special work was done in connection with the British Empire Exhibition at Wembley and the French exhibition train, some of which it may be possible to use at various points for a considerable time.

The total revenue of the department for 1923-24 was $4,228,326.14, a decrease of $27,115.64 from the previous year.

A synopsis of the work of the various branches is appended hereto, as well as detailed statements submitted by the heads of branches.

Your obedient servant,

W. W. CORY,
Deputy Minister.

OTTAWA, August 30, 1924.

LANDS PATENTS

Letters Patent.—The number of letters patent issued during the last fiscal year was 5,317, covering an area of 791,401 acres, made up by provinces as follows:—

Province	Patents	Acres
Manitoba	763	112,185
Saskatchewan	2,473	398,759
Alberta	1,841	257,809
British Columbia	223	21,970
Yukon Territory	13	649
Northwest Territories	4	29
Totals	5,317	791,401

Homestead Entries.—3,843 homestead entries were granted during the year, aggregating an approximate area of 614,880 acres, being a decrease of 1,500 in the number of homestead entries granted as compared with the previous year.

By provinces the entries were as follows: Manitoba, 632; Saskatchewan, 1,699; Alberta, 1,326; British Columbia, 186; total, 3,843.

There were 710 soldier grant entries made during the year, aggregating approximately 113,600 acres, made up by provinces as follows:—

	Number of entries	Acres
Manitoba	142	22,720
Saskatchewan	349	55,840
Alberta	187	29,920
British Columbia (Railway Belt and Peace River Block)	32	5,120
Totals	710	113,600

Accounts and Revenue.—During the fiscal year $396,845.06, including $143,292.35 interest on deferred payments, was received on account of purchased homesteads, pre-emptions and ordinary sales, being a decrease of $1,960.05 as compared with the payments received during the previous year.

The sum of $71,406.41 was received for entry fees, improvements, and sundries, making a total revenue for the fiscal year of $468,251.47.

Refunds were made amounting to $22,361.62, as follows:—

Value of improvements collected on cancelled homesteads	$ 18,914 93
Overpayments on sales; and of moneys on account of purchased homesteads and pre-emption sales, entries for which had been cancelled	3,446 69
Total	$ 22,361 62

School Lands

During the fiscal year ended March 31, 1924, no school lands were offered for sale by general public auction. A small number of parcels, for public purposes, were, however, disposed of by sale at public auction and others by private sale. The areas and values were as follows:—

Province	Area acres	Value	Average per acre
Manitoba	458·20	$ 1,629 38	$ 3 56
Saskatchewan	356·32	3,995 88	11 22
Alberta	422·02	6,973 60	16 52

The approximate net area disposed of down to March 31, 1924, after making deductions for cancelled sales and adjustments in regard to changes in area was as follows:—

Province	Area acres	Value	Average per acre	Value of town lots
Manitoba	658,602·00	$ 6,354,523 56	$ 9 65	$ 5,165 00
Saskatchewan	1,351,735·00	22,750,945 85	16 83	12,571 00
Alberta	877,044·00	12,108,072 50	13 81	39,680 00

The revenues collected for the fiscal year (less principal moneys and expenditure) and paid over to the provinces were as follows: Manitoba, $11,368.40; Saskatchewan, $359,532.76; Alberta, $243,124.27.

The amounts of interest paid in the fiscal year on the investments of the three provinces were as follows: Manitoba, $285,350; Saskatchewan, $632,325; Alberta, $333,250.

Mining Lands

The revenue during the year, derived from fees, rentals and royalties collected from mining rights disposed of by the Crown under lease or other form of terminable grant, was $697,170.68.

During the year prospecting and mining operations in the western provinces and territories have shown very considerable activity. At Keno Hill, in the Yukon Territory, a mining industry has become firmly established, and shipments of silver-lead ores in quantity are being made to Pacific Coast smelters. Placer mining in the Yukon Territory is being diligently prosecuted, but recovery of gold is now for the most part conducted by the hydraulic or dredging process. Five large capacity dredges, operated by hydro-electric power, are engaged in this work. The development of the mineral deposits of northern Manitoba is also proceeding satisfactorily.

During the year drilling operations were conducted for the discovery of oil in some forty wells, varying in depth from two hundred feet to thirty-five hundred feet, and from a number of such wells oil in limited quantity and natural gas in large quantity have been obtained. In the well of British Petroleums, Limited, on section 30, township 45, range 6, west of the 4th meridian, a considerable flow of heavy oil of asphaltic base was obtained, and a production of about seventeen million cubic feet per day of natural gas was obtained from a well in section 1, township 6, range 11, west of the 4th meridian, with a rock pressure of six hundred and sixty pounds. Natural gas obtained from widely different fields throughout Alberta is being utilized for domestic and industrial purposes.

The quantity of coal mined from Dominion and from privately-owned lands during the year in Alberta and Saskatchewan was somewhat over seven million tons, valued at more than twenty-nine million dollars. The revenue derived from this source was $404,312.24.

Timber and Grazing Lands

The total revenue derived from timber, grazing, and hay lands amounted to $883,726.90, which was a decrease of $2,337 as compared with the previous year. On timber business as a whole there was an increase but this was slightly more than offset by the falling off in returns from grazing.

There were manufactured from license timber berths 300,321,840 feet board measure of lumber, in addition to large quantities of other material consisting of 23,098,068 laths, 474,519 railway ties, 1,171,406 linear feet of mining timber, 1,139,874 linear feet telegraph poles, etc. Under permit there were manufactured 21,083,740 feet board measure of lumber, 107,000 laths, 280,080 railway ties, 675,732 linear feet of mining timber, 295,575 linear feet telegraph poles and 1,075,000 shingles, besides various other materials.

During the year 241 new timber berths were granted. The area covered by timber berths under license and permit was 7,066 square miles.

There were 7,532 grazing leases in force, of which 1,098 were issued during the year. The grazing leases cover a total area of 6,329,035 acres. Hay permits to the number of 3,601 were taken out.

Canadian National Parks

The tourist figures for the Canadian National parks indicate that the steady increase of visitors to the parks noted in the past years both of Canadian and foreign tourists was more than maintained during the past season. It is manifest that the parks are becoming year by year a most important means of providing national recreation for the people of Canada and of attracting foreign visitors to the Dominion. The figures totalled 249,068, an increase of nearly 60,000 as compared with the previous year.

The most important feature of the year's work was the completion of the Banff-Windermere highway across the Central Rockies, which was officially opened for traffic on June 30, in the presence of distinguished representatives of the Dominion, Provincial and United States Governments, and of many interested organizations. In spite of adverse climatic conditions over 8,000 cars passed over the new highway between the date of the opening and the conclusion of the season, and it is noteworthy that the number of visitors to Banff and Lake Louise showed an advance of 15,000 as compared with the previous year.

For some years the importance of our scenic resources and of tourist traffic generally as a source of national wealth has been emphasized, as well as the increasing part played by the motor car in this connection. During the year approximately 1,943,000 cars entered Canada from the United States. While it is difficult to estimate the value of such travel there is no doubt that it amounts to a very large sum and that it has had a considerable share in increasing national prosperity by building up an invisible balance in favour of Canada between this country and the United States. It is interesting to note that a widespread interest and appreciation of the possibilities of the tourist industry and of Canada's rich and largely undeveloped resources in this regard is awakening throughout Canada and that prominent financial authorities are coming to regard its development as one of the easiest means of increasing national wealth.

In consequence of the increase of the buffalo herd of Wainwright and the limited grazing capacity of the park about 2,000, mostly bulls, were slaughtered during the fall and winter of 1923. A census taken on March 31, 1924, gives the increase for the year in Buffalo park as 1,823 and the total decrease, including those slaughtered, 1,948. The number in the park at the close of the year was 6,655.

The records show that from and including the 700 buffalo imported in 1907 up to March 31, there have been 9,394 buffalo in the park during these years. It is recognized that Canada has taken the leading part in the preservation of buffalo in North America.

Largely because of continuous educational efforts the cause of migratory bird protection in Canada continues to advance. The work of the department and the various provincial governments has been co-ordinated through a conference held every winter at Ottawa. One representative from each province attends this conference and they have thus an opportunity of meeting not only their fellow workers of the other provinces, but also the Dominion officers concerned with wild life protection.

In education one of the newest features has been the preparation of a series of juvenile bird protection posters. Each of these posters is designed to give one lesson in bird protection to school children. Some of the posters are so simple that even the school child who cannot read may learn the lesson from it. In reservation of sanctuaries the usual activities have been carried on and have resulted in permanently setting aside six bird sanctuaries. Lecture work may be briefly summarized as including more than 250 addresses on bird protection during the year, as well as important talks by means of the newest educational device at our command—the radio. Instruction of the young has been emphasized both in schools and by special instruction at summer training camps. The usual measures have been taken for enforcing the law, thus keeping Canada's compact under the Migratory Bird Treaty.

Considerable progress has been made in the acquisition, preservation, restoration and marking of historic sites. Out of 800 sites reviewed 120 have been recommended for commemoration and the control of 61 of these has been acquired. Twenty-one sites have been marked by the erection of memorials.

Forestry

Two important conferences on forestry were held during the year. The British Empire Forestry Conference was convened at Ottawa on July 25, and, after an investigation of Canadian forests and forest problems, the final session was held at Victoria, B.C., on September 7. Supplementary to this, the Minister of the Interior convoked a forest fire conference with the provinces, which was held in Ottawa in January, 1924. The findings of these conferences, as expressed in their resolutions, will materially assist in the formulation and development of a national forest policy for Canada.

The revenue of the branch has recovered from the slight setback reported last year, and was higher than that of any previous year, in spite of the depression in the live-stock industry of the West. The timber revenue of the branch shows a gratifying increase, and all other items have increased except those connected with the stock-raising industry.

The provinces of Manitoba and Saskatchewan again report a very favourable year in regard to forest fires. Southern Alberta also escaped almost entirely, though the northern part of the province did not fare as well. In British Columbia the number of forest fires was the lowest experienced for years. The total number of forest fires for the season of 1923 was less than half that of the season immediately preceding it, and was the lowest on the Dominion forests since 1918.

Aeroplane patrol was continued in Manitoba and Alberta, with satisfactory results. In Manitoba some 1,200 square miles of territory was mapped from the air.

One new Dominion forest, namely, the Sandilands forest, in southern Manitoba, was created during the year. Its area is 187.75 square miles. The net increase in the area of the Dominion forests for the year is 106 square miles.

In Manitoba, there was reported a brisk demand for saw-timber and fuel-wood. Saskatchewan recorded the largest timber sale so far made in the history of the province, together with a brisk demand for lathwood, ties, and fuel-wood. In Alberta there was a lessened demand for timber sales, but an increase in the number of timber permits and the quantity of timber cut under permits. British Columbia experienced an increase in both timber-sale business and in permits. All districts report good progress in brush disposal.

The interest taken by the prairie farmers in the co-operative tree planting work of the Service was well sustained, over five million trees having been distributed in the spring of 1923. Continued interest has been manifested in planting field-shelters for the prevention of soil-drifting and in the growing of fruit trees under shelter. An interesting point in the work of the nursery has been the commencement of thinning experiments in the test plantations; this was begun in February, 1924.

The favourable fire season enabled the forest officers to pay more attention to improvements, and satisfactory progress was made in this phase of the work.

The summer resorts on the Dominion forests continue popular. The measures taken to restock the lakes in these resorts with fish have, for the most part, met with success. Small game is increasing, but, owing to encroaching settlement, big game seems to be becoming less plentiful.

The Division of Forest Resources and Statistics compiled for the British Empire Forestry Conference the most complete report on "The Forests of Canada" issued up to the present. This Division is also assisting in the forest survey of Ontario, and is continuing its study of the wood-using industries of the Dominion.

The work of the Research Division steadily increases. Results of earlier work at the experiment stations at Petawawa (Ontario) and Lake Edward (Champlain county, Quebec) are now becoming available for intensive study. In Quebec experimental cuttings were carried out in co-operation with timber owners. In New Brunswick a study was made of the actual cubic content of piled cords of wood, and co-operation was extended to the provincial forest service in reseeding burned areas.

The publicity work of the Forest Service in regard to forest fires is resulting in obtaining increased sympathy and support from the public in the work of fire prevention.

The Forest Products Laboratories report an increase in the amount of research work done, and in the number of matters investigated at the request of the public.

Water Power and Reclamation

In the interest of economy and efficiency the Water Power and Reclamation Services of the department were consolidated under the supervision of the Director of the Dominion Water Power Branch. This consolidation was gradually effected during the year without any dislocation of either service.

Water-power.—The steady advance in the Canadian water-power industry noted last year has been more than maintained. During 1923 the turbine installation increased by 255,000 horse-power and the total installation throughout the Dominion now amounts to approximately 3,228,000 horse-power,

equivalent to 353 horse-power per thousand population. Substantial as this progress is, it will very soon be largely exceeded for there are a number of large developments now under construction or actively in prospect which justify the prediction that the water-power development in Canada will be doubled within ten or twelve years.

During the past year hydro-electric construction was taking place in every province of the Dominion except Saskatchewan and Prince Edward Island. Several of these operations were of outstanding interest. In Ontario the Hydro-Electric Power Commission has been engaged in the development or extension of a number of generating stations, the chief work being the bringing into operation of two new 55,000 horse-power units at the gigantic Queenston plant. In Quebec good progress was made with a 320,000 horse-power initial development at Grand Discharge on the Saguenay river; the St. Maurice Power Company has nearly completed its 120,000 horse-power development at La Gabelle on the St. Maurice river. These are the two largest amongst a number of important enterprises in this province. In British Columbia and Nova Scotia notable progress was made.

The progress of operations on the Winnipeg river are of particular interest to this department which granted the concessions and supervises the work undertaken. Mention was made last year of the construction of the new hydro-electric power station at Great Falls where 56,000 of an ultimate 168,000 horse-power is now installed. During the past year the excavation of the channel at Whitemud falls was completed. This channel was designed to lower the water level between Whitemud falls and Great falls and thereby add ten feet to the head available at the power station. The results obtained abundantly justified the expectation of the department's engineers.

The city of Winnipeg towards the end of 1923 awarded a contract for the installation of three new 7,000 horse-power units at its Pointe du Bois station. This will bring the installation to 82,000 horse-power with provision still remaining for two additional units.

The Hydrometric Survey of Canada is proving of increasing value to all organizations to whom the availability of water or probability of flood is a matter of importance. The Water Resources Index-Inventory work continues with satisfactory results and the inventory makes it possible to place Dominion or Provincial Government officials, engineers and the general public interested therein in immediate touch with the most recent and authentic information obtainable.

While water-power cannot take the place of fuel for heating purposes except in certain restricted cases, it can effect a marked fuel saving by replacing fuel as a power-producing agency wherever it is economically advantageous to do so. In Canada, where the climate necessitates a large fuel consumption for heating, the practical elimination of fuel from the central station industry represents a great saving of fuel, in fact the water-power development already completed represents an annual saving of 29,000,000 tons of coal which, valued at $10 per ton, represents $290,000,000 annually, much of which would have to be expended for importation.

Irrigation.—Climatic conditions throughout the semi-arid portions of Alberta and Saskatchewan were, during 1923, very favourable for crop production and as a result heavy yields of grain were obtained without irrigation.

Irrigation works have been constructed capable of irrigating 1,100,000 acres at a cost of about $30,000,000. The lands within a number of projects included in this area are not as yet fully developed and settled. An additional 65,000 acres of irrigable land are within organized districts which have been shown by preliminary surveys and cost estimates to be feasible and which will proceed

with construction as soon as the necessary financing can be arranged. Surveys are also completed for numerous projects considered feasible, totalling 550,000 irrigable acres. The land comprised in these latter projects is in private ownership and its development under irrigation is dependent on the landowners organizing under provincial legislation, which provides means for financing construction.

In the administration of the Irrigation Act, a total of 1,526 schemes were in good standing at the end of the year. These include all licenses, permits, authorizations, and applications which are recorded for the use of water. Ninety-six new applications were filed during 1923 and 262 schemes were under investigation.

Drainage.—During the year no new large drainage projects under the provisions of the Reclamation Act were investigated by the department. The work on projects of this character was entirely confined to completing the construction of the Waterhen drainage district situated near Kinistino, Sask., and the investigation of the Carrot River Triangle drainage project in northern Saskatchewan and Manitoba.

The Dominion land reclaimed in Waterhen lake has been leased for a number of years, at a nominal rental, to demonstrate its agricultural value before offering it for sale.

The matter of preparing final plans, estimates of cost and a full report of the Carrot River Triangle drainage project is now in the hands of the engineers who carried out the investigations.

Forty-nine small drainage projects were investigated or inspected in the provinces of Alberta and Saskatchewan. At the present time there are about 12,000 acres of low lands included in these small projects, the average cost of which to reclaim is approximately $8.90 per acre. Favourable progress and successful reclamation were found to obtain in connection with these projects.

North West Territories and Yukon

Northwest Territories.—During the year progress was made with the construction of the means of wireless communication from the Arctic coast and the Yukon, across the Northwest Territories, to civilization. Stations were completed and put into operation at Dawson and Mayo and it is expected that those at Edmonton, Simpson, and Herschel will be in operation in 1924-25. From this work benefit will accrue to trade, transportation and to development work throughout the whole of the Northwest, and administration will be facilitated. Aids to navigation, in the form of buoys, beacons, etc., along the Mackenzie system of waterways have been established because of the increased traffic.

The schools and hospitals were carried on satisfactorily and the health of the population on the whole was reported to be good.

During the annual expedition to the Arctic Archipelago in the summer of 1923 a new post was erected at Pangnirtung, in Cumberland gulf, and the existing posts were inspected and provided with supplies for the coming year. A number of lots required for the police posts or for private companies were surveyed. An examination by the medical officer of the expedition showed the health of the natives in this district to be generally satisfactory.

The numbers of hunting and trading licenses reported during the year show a substantial increase. The total value of skins recorded under the Northwest Game Act for the year was estimated at $1,753,362.62.

Under the protective measures inaugurated last year, including the establishment of a Wood Buffalo park of 10,500 square miles, the wood buffalo are increasing and thriving and have been further protected against white and native trappers.

The reindeer herd was transferred from Lobster bay, Quebec, to Anticosti island during August and is reported to be doing well in the new environment.

Measures to protect the caribou and musk-ox are being carried out by regulations, publicity, and by the destruction of predatory animals.

The effort to ensure the subsistence of the native wards of the nation by the setting aside of game preserves for native hunters and from which white hunters are excluded has been continued. During the past year an area of 241,800 square miles divided into six preserves located in different parts of the Northwest was so set aside. Further protection has been afforded by the increased rates of license fees for hunting, trapping, trading, and trafficking, in the case of non-residents and by the increase in the bounties offered for the destruction of predatory animals. In the past year a specially organized wolfing expedition resulted in securing the killing of 135 large timber wolves which are particularly destructive to caribou.

Yukon.—Mining in the Yukon being dealt with in the report of the Mining Lands Branch the other administrative features are dealt with here.

The agricultural season was favourable specially for hay. Most crops gave good returns and matured well. Samples of wheat and barley were sent to the British Empire Exhibition.

One hundred and three permits to cut wood and timber were issued during the fiscal year. This was a slight decrease as compared with 1922-23 and there was also a similar decrease in the quantities cut.

Dawson secured a limited supply of coal from the mine at Tantalus Butte and an increased output is expected for the coming year.

The public health was good, and the hospitals were efficiently conducted. The number of pupils attending school increased and an additional school was opened.

Measures looking to the protection of the big game through the destruction of wolves and other predatory animals were adopted by the Yukon Council.

Surveys

TOPOGRAPHICAL SURVEY OF CANADA

The annual report of the Topographical Survey of Canada, which is issued as a separate publication of the department, contains a detailed statement of the work performed during the year. The following brief summary indicates the progress made in the main divisions of the work of the Survey, which, in addition to the several types of monumented surveys, includes general and topographic mapping and the classification of lands.

Thirty-seven parties were in the field as compared with thirty-six in the season of 1922-23, but the average size of the parties was much reduced from previous years. The parties were distributed throughout the Dominion on the various classes of work. All parties working in the West reported an unusually wet season which interfered considerably with the work, but on the whole, excellent progress was made.

The number of requests for surveys of various kinds increased greatly and there was also an increased demand for the publications issued by the Survey. Approximately 32,000 plans, 35,000 maps, and 2,500 pamphlets and reports were distributed.

Topographical Surveys.—In response to requests from the respective Provincial Governments, the work of establishing control for topographical mapping was pushed rapidly in the vicinity of New Glasgow and Pictou in Nova Scotia, and near Sussex in New Brunswick. In Quebec some final mapping on the scale of one inch to one mile was made on Warwick sheet in the Eastern Townships in conjunction with the Department of National Defence.

In the western provinces the revision of sectional sheets was continued. Three parties working in Saskatchewan and one party in Alberta completed the field work for four sheets. The information obtained by these parties about roads, buildings, forest cover, etc., is combined with that obtained from previous land surveys and from other sources. The field work has been completed on twenty-seven sheets covering about 116,000 square miles, and eighteen of these sheets have been issued. The scale of publication is one inch to three miles and the sheets are of a uniform size of 24 inches by 34 inches.

Since 1886 surveys in the mountainous regions of Alberta and British Columbia for mapping purposes have been carried on by photo-topographic methods. During the year one party thus employed covered 450 square miles on the southwest part of Calgary sheet.

Land Classification Surveys.—Land classification surveys which were carried on in the Peace River country in the preceding year were conducted in more settled country in 1923, namely, in the districts of Vegreville and Sylvan Lake in Alberta, and Turtleford and Preeceville in Saskatchewan. A total of 18,375 quarter-sections containing 2,940,000 acres were examined, mapped, and reported upon. Two other parties carried on reconnaissance classification work in and adjacent to certain forest reserves for the purpose of rectifying the boundaries thereof.

These land classification surveys are for the purpose of aiding development by assisting settlers in the selection of suitable lands. They give detailed information about the country which it was impossible to secure during the rush of subdivision work in earlier years. In these surveys the unit of investigation is the quarter-section and these are graded into twelve classes according to soil, surface, waste land, etc. A map of each district selected was made showing the information gathered to assist the incoming settler. Some of the things shown on these maps are the kind of soil, the extent of settlement already in the district, the amount of prairie and of timber and bush land, the streams and lakes, the shipping facilities, and the position and condition of roads and trails.

Township plans suitably coloured on the scale of 40 chains to one inch were also prepared and copies placed in the offices of the Dominion Lands agents. These plans show in great detail the particulars for each quarter-section. In addition to the district map and the township plan there is a general report on the district and also an individual report on each township describing existing settlement, school and church accommodation, climate, etc.

The cost of this work has been remarkably low, being one and one-half cents an acre including field examination and the preparation of maps and reports.

During the year 106 township plans were prepared, three land classification maps were revised and three new ones were issued, bringing the total to fourteen.

Control Traverse and Exploratory Surveys.—In order to establish permanent and reliable monuments for the control of geological and forestry investigations, fire patrols, navigation maps, and aerial mapping, for the tying-in of settlement lots, group lots, and mining claims, and generally for the guidance of prospectors and all others interested in the development of the natural resources of Northern Canada, control and exploratory surveys were continued.

The control traverse survey of Mackenzie river, begun in 1921, was carried to completion by a party which wintered in Aklavik. The line reached the ocean at Kittigazuit to the east of the delta of the Mackenzie and at Shingle point to the west. Peel river was traversed for some distance above McPherson. Another party completed the traverse of Great Bear river. The survey of Great Slave lake also begun in 1921 was continued by a party which traversed the North arm and some of the islands. The chief of this party made a canoe

trip into the so-called "Barren Lands" by way of Clinton-Golden and Aylmer lakes and connecting streams and brought back much valuable information about this little-known district.

These surveys have been completed so far as to enable navigation maps to be issued covering the waterways from the railway terminus at McMurray through to the Arctic ocean, a distance of 1,800 miles, as well as a large part of Great Slave lake and Great Bear river. In the course of the work the surveyors at very little extra cost also established lights, buoys, beacons, and other aids to navigation at various danger points along these waterways.

Two other parties working in the gold and copper mining district of northern Manitoba traversed the Cranberry lakes, Reed lake, Herb lake, and Grass river. Monuments were placed on these lines in conspicuous places from two to four miles apart, and these will serve as convenient points to which to tie in the hundreds of mining claims in the vicinity. In addition one of the parties carried a line northward from Athapapuskow lake via Kississing lake and river to Churchill river, and thence southward to Reed lake via File River route. The lines thus laid down formed the basis of control for a series of aerial photography from which at moderate cost a detailed map of the country is being compiled. The total shoreline traversed was 5,600 miles.

Aerial Surveys.—Working in close co-operation with the Air Board of Canada, the Topographical Survey undertook an investigation looking to the utilization of aerial photography as an aid to mapping, and, after a series of exhaustive experiments, secured satisfactory results. The investigation had to do chiefly with the taking of oblique photographs over a part of the mineralized area of northern Manitoba. The area chosen is characterized by numerous bodies of water with irregular and most intricate shorelines, and countless islands where the cost of making a map by the ordinary traverse methods is prohibitive. By using the fire-patrol plane operating from a near-by base the cost of the flights necessary to map some 900 miles of waterways is limited almost to the cost of the photographic films. In this work the ground control was furnished by a control traverse survey. The resulting map will show this hitherto unmapped area in great detail.

Miscellaneous Surveys.—Several surveys of a minor nature were rendered necessary at Banff, Jasper and near lake Edith by the development of the Canadian National parks.

To avoid confusion in the laying out of coal lands in Alberta a control survey was undertaken along section lines in tp. 47-24-5 and the locations of coal claims tied-in thereto.

Subdivision was extended over the drained portion of Waterhen lake in Saskatchewan, and that part of Beaver Hills forest reserve which on account of its suitability for agriculture has been thrown open to settlement.

Settlement surveys were made at Chipewyan on lake Athabaska, at Fort Rae on Great Slave lake, at Great Bear lake, at McPherson on Peel river, and at Aklavik on the Mackenzie River delta. One surveyor was attached to the Arctic expedition carried out by the North West Territories Branch and laid out lots as required in Baffin, Ellesmere, and North Devon islands.

Interprovincial Boundary Surveys.—Work on the boundary between Alberta and British Columbia was continued as in past years by two parties. One of these carried on a photo-topographic survey of the watershed from Bess pass near the south of tp. 50-10-6 to tp. 50-14-6, the work being tied-in to points previously established by the Geodetic Survey, and at the same time carried on detailed topographical exploratory work for one and one-half miles on either side of the line.

By arrangement with the Provincial Governments of Alberta and British Columbia, each of which bears one-third of the cost, the work will be discontinued at the end of the season of 1924, by which time it is expected that the gap of some sixty miles from township 61 southward to the mountains will be completed. The boundary will then be marked for 750 miles from the International Boundary northward or to a point about twenty-five miles north of the Peace River Block.

Levelling.—Four parties, employed exclusively in extending the level net over the Prairie Provinces, ran 1,472 miles of levels. On these lines permanent bench-marks were placed at intervals of three miles so as to form convenient reference points for municipal authorities and private individuals interested in drainage or other engineering problems. In addition, seventy-seven and one-half miles of levels were run along the Alberta-British Columbia boundary and 700 miles in New Brunswick and Nova Scotia in connection with the topographical surveys in these two provinces. This latter work was undertaken at the request of the provincial authorities. The total of all classes of levelling is now approximately 38,200 miles.

Mapping.—During the year the maps called for by the surveys of 1922 were completed, and a good start was made on the maps for the 1923 surveys. Interest in relief map work continues to increase especially in maps of city districts.

GEODETIC SURVEY OF CANADA

A report in detail of the operations of the Geodetic Survey of Canada is issued as a separate publication of the Department: the following is a brief synopsis of what has been accomplished during the fiscal year 1923-24.

From May 5 to December 15 parties were in the field, distributed in all the provinces. The main purpose of the various undertakings of the Geodetic Survey was to provide control data, in the vertical and in the horizontal, required by surveying and engineering organizations throughout the Dominion. The work falls naturally under the following heads: precise levelling, triangulation, base line measurement and geodetic astronomy.

Precise Levelling.—Five levelling parties were in the field; they established lines in New Brunswick, northern Quebec, the city of Quebec, the Eastern Townships, Que., the vicinity of Winnipeg, Manitoba, and Sioux Lookout, Ont. Important extensions to trunk lines were made; branch lines were run to serve districts where vertical control has not been provided hitherto. A number of lines were inspected. The inspections were made as soon as possible after the bench-marks were established and always preceded the publication of results.

Triangulation.—The progress of primary and secondary triangulation was satisfactory. Reconnaissance for the extension of geodetic control to the district around Sussex, N.B., was completed. In Nova Scotia angle measurement was completed along the eastern coast of Cape Breton island from Sydney to cape North. The scheme consisted of eleven stations, six of which were situated inland. Cape North forms the junction point of a circuit of triangulation covering the Magdalen islands, Que., the northwest shore of the gulf of St. Lawrence, the Bras d'Or region and the east coast of Cape Breton island. This circuit closed satisfactorily, the closing error being in the ratio of 1 to 320,000. Tower building was completed as required in Cape Breton island and Nova Scotia. Reconnaissance on the north shore of the gulf of St. Lawrence progressed favourably. Direction measuring and tower building on the lower St. Lawrence river and the gulf resulted in twenty-nine primary

stations and one secondary station being occupied and completed. All lighthouses and churches within range of Gaspe peninsula and North Channel stations were observed on, together with several Hydrographic Survey signals. The triangulation of the city of Quebec and the surrounding district was completed. Primary triangulation was extended up the valley of the Ottawa river; also on the 49th parallel Canada-United States boundary eastward from the 109th meridian. Secondary triangulation to furnish control points for topographical sheets for the Alberta-British Columbia boundary was extended along the continental divide to its intersection with the 120th meridian. On the Pacific coast primary triangulation was extended. The British Columbia net was connected with the Alaska boundary triangulation.

Geodetic Base Lines.—Two primary bases, one in Cape Breton island, the other in New Brunswick, and one secondary base, in northern Quebec, were measured.

Geodetic Astronomy.—Three Laplace stations (combined triangulation, longitude and azimuth) were occupied, namely, Sugar Loaf in Cape Breton island, Campbellton in New Brunswick and Chicoutimi in lake St. John district, Quebec.

INTERNATIONAL BOUNDARY

The surveying operations in connection with the final demarcation of the International Boundary line were completed by the end of the fiscal year 1922-23, but discrepancies were discovered by the computers, in the survey records along the tortuous "Highland" boundary between Quebec and the state of Maine, and a joint investigation on the ground was undertaken, which occupied the time of a small joint party, from September 15 to November 1.

A party of six men with two teams was engaged in rebuilding and repairing monuments along the straight line section between the St. John river and the "Highlands." Forty-eight were rebuilt and three repaired.

During the year twenty-seven map sheets were engraved and printed and twenty-nine others were prepared, and are in the hands of the engravers.

In July the Canadian Commissioner made an examination of the vista and monuments along the south and southeast boundary line between Quebec and Maine, and in September a joint inspection was made by the commissioners of the "Highland" boundary from the southwest branch of the St. John river to Arnold lake.

It is expected that the third joint report of the commissioners; that on section 3, from the source of the St. Croix river to the St. Lawrence, will be printed and ready for presentation to Parliament during the present session.

On the remaining four reports a great deal of work was done, as well as the classification and indexing, separately, of the correspondence, notes, maps, sketches, photographs and geographic data, of each of the ten sections of the boundary line.

Dominion Observatory, Ottawa

Observations are now being carried on with the meridian circle on the Bachlund and Hough list of fundamental stars. This list with the clock stars, polars, etc., comprises about 1,575 stars. In addition the clock stars are being observed throughout the day whenever possible. Besides obtaining star positions, it is hoped in this work to obtain information on some of the unexplained variations that every observatory finds in its clock rate. During the year observations were obtained on 129 nights. Work on the computation of the former observing list is proceeding and the results will be published as soon as possible. The two Riefler master clocks, which are compared twice a day, have shown satisfactorily even rates.

The time service has been maintained as in previous years. From the four primary master clocks there are synchronized continuously fifteen secondary master clocks; these in turn control two tower clocks, one program clock and about 575 dials. Relays, beating seconds, are maintained in three offices in the city, one clock is synchronized every hour, time signals are sent out by telegraph and telephone and the time is recorded on the various seismographs at the observatory.

A time comparison is made daily with Washington and Paris, by means of the wireless time signals sent out by Annapolis and Lafayette. This is in co-operation with the International Time Commission, in connection with the investigation of unexplained discrepancies in meridian observations. In addition during the winter months a comparison was made twice daily with Honolulu as often as the signals could be received, in conjunction with similar comparisons in Australia for determination of longitudes. The larger aerial has improved signal reception very materially. Tuned radio frequency amplification along with a separate heterodyne which gives improved control of the signal have been in use, and these make reception from the distant stations possible continuously except for occasional periods during the summer when there appears to be serious "fading" or absorption. Radio transmission of time signals has been inaugurated through the new Canadian National Railways station in Ottawa.

The 15-inch equatorial telescope has been utilized as heretofore for obtaining radial velocities of stars, a total of 787 spectrograms having been made with exposures varying from thirty minutes to three hours; 140 direct photographs of star fields were obtained with the short-focus camera attached to the equatorial; 78 direct photographs were also obtained with the Brashear 8-inch doublet. Detailed studies of stars of the Beta Canis Majoris type have been continued along the lines indicated in previous reports; additional evidence has been found of the close connection between stars of this type and the Cepheid variables. For the proper carrying on of this investigation it has been found desirable to study both the visual and photographic light curves of these stars in conjunction with the radial velocity curves. A certain amount of work has already been done on the photographic curves, which have been deduced from the photographs mentioned above, the complete light curves of 9 stars having been obtained. To extend this investigation to a larger number of stars preparations are being made for utilizing a small equatorial mounting belonging to the observatory, which it is proposed to mount on the roof to carry several cameras. For the study of the visual light curves a photo-electric photometer of the latest type has recently been ordered in Paris.

The equatorial has, as usual, been available to the public every clear Saturday evening with an officer in charge to explain the objects shown.

The cœlostat and solar spectrograph were used to secure 260 observations of spectra of limbs, midway positions and centre of solar disc, with comparison spectra of iodine and electric arcs. In addition considerable work was done with electric arcs at low pressure. Measurements were made of 480 spectrograms, and computations of these and 150 additional measurements. Computations of earlier measures of the solar rotation have been made in the effort to eliminate the error due to oil in the measuring instrument. The spectro-comparator has been equipped with prisms and lenses to reflect the readings of the micrometer drums into the focal plane of the microscope so that readings can be made without removing the eye from the microscope.

The magnetic work during the season 1923-24 was carried out in accordance with the methods adopted for the work of previous years. Two parties were engaged in field work for approximately six months. As in 1922 the field of

operations was, for the most part, outside the territory heretofore covered by this branch. One party occupied a station at Hay River, N.W.T., and a series of stations at intervals approximating 75 miles from Brabant harbour to Aklavik, which is within 100 miles of the Arctic ocean, thus continuing the work of 1922 which was discontinued at Fort Resolution. The other party worked in the territory lying northeasterly from The Pas, Man. and extending to Hudson bay. The route followed from The Pas to Hudson bay was by way of Athapapuskow and Cold lakes and Cold river to Pukkatawagan post on the Churchill river, thence down Churchill river through Granville and Southern Indian lakes to Missi Falls. From the northwestern part of Southern Indian lake the Seal river was reached by three portages and followed to Hudson bay. The return to The Pas was made by Hudson bay, the Hayes river and Nelson river, touching at Churchill, Port Nelson, York Factory, Oxford House, Norway House and Thicket Portage on the Hudson Bay railway, thence by railway to destination.

The total number of stations occupied was fifty-one; of this number fourteen were either exact or approximate relocations of stations occupied originally by the Meteorological Service of Canada or the Carnegie Institution of Washington. The office work, which occupied the remainder of the year, was confined exclusively to the reduction of field observations.

No field observations for gravity were made during the past year, the single officer in this division having been for the most part occupied with necessary office work. The reductions for topography and compensation for the nine gravity stations in the Mackenzie basin have been completed and a report on this work has been published. One of the results has been the determination of the depth of isostatic compensation in that region. Similar reductions for the forty-two gravity stations previously established were begun during the year and are now practically completed. A fairly extensive test was made of the new torsion balance received last year, but it has been found necessary to return this instrument to the makers for certain alterations.

During the year 297 earthquakes were registered. Those records which yielded definite readings for time and distance were reported through the press, and all were reported by monthly bulletin to the 220 seismological stations on our mailing list. The Location of Epicentres for 1921 was completed and has been forwarded for publication. The data from sixty-two different stations have been incorporated into our records for future publications on epicentre locations. Continuous seismographic service has been maintained throughout the year, and in addition experimental field stations were established at Shirley Bay and Kemptville, each of which was kept in operation for a period of about six weeks. A publication covering this experimental work is in course of preparation.

Four of the regular series of observatory publications were issued during the year, as well as eleven scientific articles by various members of the staff, which were published in scientific periodicals.

Dominion Astrophysical Observatory, Victoria, B.C.

The number of spectra obtained during the year ended March 31, 1924, was 1,050, as compared with 1,378 of the previous year. The smaller number does not mean poorer observing weather, as it was on the whole somewhat better, but is due to longer exposures given to fainter stars and other celestial objects. The dome was opened on 211 nights, on 10 of which no usable observations were secured at all. On 22 nights only one stellar spectrum was secured while on 22 other nights a total of twenty-two plates was obtained of the spectra of nebulæ and other faint objects whose average exposure time was in the

neighbourhood of six hours each. Dividing the workable nights into two classes there were 127 good nights when five or more spectra were obtained and 74 fair to poor, when less than five were obtained.

The investigation of the O-type stars has been completed and the publication containing the results thereof is now in press. It summarizes existing knowledge of this class of stars, gives the results obtained here of 528 spectra of the 80 stars observed and then discusses these results statistically. These stars are among the most massive and luminous known, as they have a mass 10 to 80 times and a luminosity about 4,000 times that of our own sun. The extensive data secured seemed to warrant its examination with a view to finding a working hypothesis to account for the difference in velocity between that given by the calcium lines and the other stellar lines in general. Such a theory is proposed and a paper on the subject was presented to the Royal Society of England last December.

The determination of the absolute magnitude and spectroscopic parallaxes on which progress was reported last year has now been completed. A short paper containing some of the results has already been published and the detailed publication is in the printers' hands. It contains the results for 1,105 stars and is one of the largest single pieces of work yet issued by the observatory. As a by-product a publication giving the radial velocities of 125 stars was issued during the year.

A paper on the intensity distribution in spectra as determined by the wedge method has been issued during the year and gives improved values, it is believed, of solar and stellar temperatures. A large amount of observational evidence has been accumulated regarding the nebulæ, preparatory to a discussion of their spectra, and a preliminary suggestion has been made as to the origin of the lines of nebulium.

Three spectroscopic binary orbits have been determined, two of which are based upon the spectra of both components. An observing assistant in the summer months has brought the catalogue of radial velocities and spectroscopic binaries up to date.

The telescope has given satisfactory performance as heretofore. A camera lens refigured according to Ross to give a flat field has been received and is found very suitable for three-prism work. A short focus Moffitt lens for single-prism work has also been received, making the spectro-graphic equipment quite complete.

The usual two hours on Saturday evenings have been given to visitors when they are permitted to observe celestial objects with the large telescope. During the tourist season several hundred avail themselves of the privilege on each occasion.

Some time has been spent on the details of the new office building now nearing completion. It should make working conditions more satisfactory for the staff as well as giving suitable space for the library, which yearly increases in size from new books and exchanges received. It is hoped to move into it in July or early August.

This is the sixth annual report of the work of this institution in which actual observations commenced on May 6, 1918. The details of the work are presented in complete form in the publications of the observatory, of which six numbers were published during the year with another number almost through the press. This last number, making a total of forty-six, carries with it an index and title page and completes the second volume. Another extensive publication is now in the printer's hands and will appear as the first number of Volume III.

Natural Resources Intelligence Service

The demand for information regarding Canada's natural resources continued as in previous years. Of special interest in this connection was the large increase in the number of requests, chiefly from Americans, for tourist information, including outing trips such as automobile, canoe, hunting, fishing and walking trips, routes, highway information, maps, conditions of entry into Canada, game laws, permits, etc. The French exhibition train and the British Empire Exhibition called for special efforts on the part of the Service. For the French train some 300 coloured transparencies were prepared while the Empire Exhibition called for the making of large numbers of enlargements, special display maps, as well as the furnishing of reports dealing with the resources of various parts of Canada.

Information Service.—During the year the Natural Resources Intelligence Service received some 13,400 requests for resources information and in response issued approximately 47,000 economic maps and 106,000 reports and pamphlets. Of these some 36,200 publications were supplied to commercial firms, 8,300 to prospective land settlers, 6,800 to educational institutions and 40,700 to general applicants. The distribution by countries shows 14,900 copies to residents of the United States, 11,600 to correspondents in Great Britain, and 1,350 to individuals in other countries. The various federal and provincial departments made use of the publications of the Service, a total of 61,000 copies being required for their use. In addition to the above, 9,500 requests were received in the Chief Geographer's division necessitating the distribution of some 157,800 maps.

During the year inquiries were received from France, Australia, South Africa, Denmark, Holland, New Zealand, Jugo-Slavia, Switzerland, Japan, India, Poland, Straits Settlements, Hungary, Germany, China, Italy, Mexico, Chili, British Guiana, Cuba, Brazil, French West Indies, Malta, Argentina, Dominican Republic, Columbia and Belgium, thus showing the widespread interest in Canada.

Special attention was devoted to equipping the libraries of all passenger steamers sailing under the British and United States flags with a copy of the report "Canada Natural Resources and Commerce." In view of the increased interest being displayed in Canadian securities throughout Great Britain and the United States, special attention was also devoted to supplying leading investment and bond houses with data likely to prove of assistance in extending the foreign market for such securities.

A number of lecturers took advantage of the opportunity to extend their knowledge of conditions in Canada through a study of the data contained in the publications of the Service. Several of these lecturers were former Canadians and proved excellent mediums through whom audiences were furnished with information regarding Canada's attractions, from the point of view of settler, investor, and tourist.

Land Resources Division.—During the year a fourth edition of the lists of "Unoccupied Lands for Sale" in the three Prairie Provinces was published, giving information respecting each parcel, including price and terms, and name and address of the owner. This information, in conjunction with the land settlement maps and the bulletins of the service, gives the prospective land seeker an effective means of choosing lands suitable to his means and requirements and of getting in touch with those who have idle lands for sale.

Two maps having a bearing on land settlement and agriculture possibilities of the country were prepared. One, a "Vegetation and Forest Cover Map" compiled in co-operation with universities and federal and provincial services, indicates the range of the different types of forest growths and vegetation in

Canada, the distribution of agricultural areas and the limits of commercial timber. The other, a "Physical and Climatic Map of Manitoba, Saskatchewan, and Alberta," shows elevations in Western Canada, the average annual precipitation in the different parts of the country, the prairie, light brush and heavier wooded parts of the western provinces, and particularly the length of the growing seasons in the various localities.

The large number of inquiries regarding fur resources, which were received from widely separated localities, including nearly one-third of the states of the Union, sought information regarding hunting and trapping districts, routes, market prices and pelts, game laws, etc. To meet requests for information regarding the domestication of wild fur-bearing animals special memoranda were prepared and made available for distribution in mimeographed form. Through the co-operation of fur-trading organizations and the game departments of the several provinces, detailed information was obtained respecting the variety and relative abundance of fur bearers in the various parts of the Dominion.

The growth of the recreational spirit, now seeking an outlet in forest, along streams, and in hunting, fishing, or motor travel, and the numerous requests for information on these subjects has made it necessary to pay particular attention to this phase of the country's resources. With the co-operation of the provincial game officials data relative to the game resources of Canada have been collected and collated and are being prepared for general distribution. A map of Nova Scotia, one of a proposed series for tourist purposes, was issued, indicating natural resources, accessible fishing and hunting resorts, motor roads, railroads and connecting links with the other provinces and the United States.

Mapping.—The work in this division embraced the preparing of official base and other geographic maps of the Dominion, and the issuing of maps of an economic nature, including land maps, resources maps, and maps showing information from departmental and other records in such form as to be of practical use to tourists and to those who are investigating opportunities for development in Canada.

Special work done during the year included three large maps for the British Empire Exhibition. One of these, prepared in co-operation with the Canadian Pacific Railway, was prepared on steel plates and was 29 feet by 10 feet in size. This map indicated resources and transportation routes and was specially fitted to show this information by coloured electric lights. The other two maps were, one showing resources and transportation routes, size 19 feet by 10 feet, and one showing geology, physiography and mineral resources, size 19 feet by 22 feet.

Research Work.—The staff of the Research Division carried on investigations relating to the utilization and development of natural resources, more particularly of related groups of resources. Reports were prepared and published on such subjects as: The Resources of Nova Scotia, its Development and Opportunities; The Hudson Bay Railway and Hudson Bay; Districts in Canada Especially Suitable for Men of Moderate Means; Compact Facts about Canada; The Natural Resources of the Cochrane and James Bay Area. Many articles embodying the results of research and compilation were prepared for publication in technical, financial and trade papers as well as for lecture and educational purposes.

Technical Plant.—The consolidation in this division of the photographic, lantern slide, photostat, blue-printing, and mimeograph work has effected economy in staff, material, and equipment which enables the department and other Government services for which work is done to obtain efficient service at low cost. In this division is maintained a photographic and lantern slide

library. Lantern slides are made up into sets and these along with lectures or lecture notes are loaned to educational and other institutions or organizations where it is considered that they will be of assistance in the development of our natural resources. During the past year the demand for these sets has been greater than usual, and the service given to the United States reached audiences of several thousand.

Field Work.—During the year three of the engineers of the branch were engaged in field work: one in Nova Scotia, one in western Ontario and the third in the district around Edmonton, Alberta. The work comprised an investigation of industries, raw materials used and markets, labour, agricultural development, etc., with a view to the greater development of our natural resources. Definite lines of co-operation were established with civic bodies such as boards of trade, chambers of commerce, municipal councils, etc., which are concerned particularly with local development, and with the provincial government departments concerned with provincial development.

THE LAND SITUATION—Area of Manitoba, Saskatchewan and Alberta, January 1, 1924

—	Land	Water	Total
Area of Manitoba	148,432,640	12,739,840	161,172,480
Area of Saskatchewan	155,764,480	5,323,520	161,088,000
Area of Alberta	161,872,000	1,510,400	163,382,400
Totals	466,069,120	19,573,760	485,642,880

DETAIL of Surveyed Areas

—	Manitoba	Saskatchewan	Alberta	Total
	acres	acres	acres	acres
Area under homestead (including military homesteads)	8,235,600	27,657,400	18,217,200	54,110,200
Area under pre-emption, purchased homesteads sales, halfbreed scrip, bounty grants, special grants, etc.	5,109,100	7,533,100	3,821,300	16,463,500
Area granted to railway companies	3,566,997	15,177,063	13,120,014	31,864,074
Area granted to Hudson's Bay Company	1,206,400	3,184,000	2,177,800	6,568,200
Area of School Land Endowment (1-18 of area surveyed in sections)	1,637,700	3,943,500	3,756,000	9,337,200
Area sold subject to reclamation by drainage	.....	23,188	34,837	58,025
Area sold under irrigation system	.....	76,832	981,877	1,058,709
Area under timber berths	961,900	675,800	1,347,200	2,984,900
Area under grazing leases	95,371	2,929,037	2,870,957	5,895,365
Area of forest reserves and parks	2,901,939	5,925,980	16,807,347	25,635,266
Area reserved for forestry purposes (inside surveyed tract)	323,100	1,074,300	1,677,500	3,074,900
Area of road allowances	977,132	1,468,330	1,287,406	3,732,868
Area of parish and river lots	505,361	84,015	118,565	707,941
Area of Indian reserves	433,957	1,071,061	1,368,337	2,873,355
Area of Indian reserves surrendered	88,695	410,440	302,675	801,810
Area of water-covered lands (inside surveyed tract)	4,260,500	1,904,820	2,297,160	8,462,480
Area undisposed of	5,511,500	5,917,800	15,586,000	27,015,300
Total area within surveyed tract	35,815,252	79,056,666	85,772,175	200,644,093

SESSIONAL PAPER No. 12

STATEMENT of Land Sales by Railway Companies having Government Land Grants and by the Hudson's Bay Company

Year	Hudson's Bay Company		Canadian Pacific Railway Company		Manitoba, South-western Colonization Railway Company		Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Company	
	Acres	Amount	Acres	Amount	Acres	Amount	Acres	Amount
		$		$		$		$
1893	.....	.....	93,184	295,288	14,164	57,559	1,603	.....
1894	7,526	48,225	43,155	131,628	6,312	280,003	640	.....
1895	4,431	23,209	55,453	176,950	5,623	22,330	2,391	.....
1896	9,299	52,410	66,624	220,360	21,254	88,568	286	.....
1897	10,784	53,277	135,681	431,095	63,800	634,644	2,524	.....
1898	62,000	310,000	242,135	757,792	106,473	363,982	22,534	.....
1899	56,875	274,625	261,832	814,857	58,019	199,558	61,030	178,517
1900	70,196	352,631	379,091	1,152,836	133,507	437,449	18,932	53,974
1901	82,308	399,804	339,985	1,046,665	59,749	214,953	22,266	74,810
1902	269,577	1,412,332	1,362,478	4,440,500	206,411	713,365	39,835	147,365
1903	330,046	1,939,804	2,260,722	8,472,250	250,372	699,210	843,900	1,476,900
1904	144,857	879,910	857,474	3,516,864	29,522	113,303	.....	.....
1905	139,721	865,905	411,451	2,045,800	80,342	296,936	.....	.....
1906	236,191	1,863,375	1,012,322	6,015,060	83,418	360,889	.....	.....
*1907	69,158	742,221	851,083	4,817,682	3,051	22,645	1,353	16,789
1908	21,184	267,215	81,060	727,367	31,982	153,007	5,621	68,869
1909	25,449	288,836	29,331	383,390	10,396	84,845	37,662	380,371
1910	104,382	1,297,454	655,585	10,473,425	14,501	126,950	106,060	964,600
1911	267,038	3,747,768	715,695	10,372,661	20,313	284,859	113,533	1,237,204
1912	42,554	808,943	855,280	12,420,488	18,932	117,497	35,213	495,116
1913	53,581	1,128,806	447,158	6,348,352	2,768	48,639	15,395	255,399
1914	26,292	572,837	263,962	4,242,089	7,626	91,948	1,629	21,546
1915	16,400	306,550	151,262	2,496,872	489	5,508	1,292	19,118
1916	79,310	1,273,144	242,215	3,670,421	4,780	58,808	12,246	180,361
1917	254,941	4,234,244	405,764	6,612,040	12,470	165,245	21,533	331,596
1918	386,394	6,914,947	545,285	11,044,883	25,933	321,005	49,723	783,062
1919	285,561	4,978,950	602,555	10,580,669	5,289	67,214	33,838	527,670
1920	276,629	4,724,941	571,571	11,356,146	4,623	56,760	32,095	474,895
1921	178,301	3,037,369	275,636	5,898,994	1,518	20,058	11,432	160,472
1922	33,595	545,611	101,497	1,732,350	1,519	15,497	1,274	22,315
1923	24,976	366,257	83,485	1,248,968	373	5,107	1,122	17,000
1924	33,434	456,386	45,911	775,205	637	3,822	6,242	92,145
Totals	3,602,990	44,167,986	14,445,322	134,719,897	1,286,166	5,480,063	1,503,144	7,980,094

*Nine months to March 31.

STATEMENT of Land Sales by Railway Companies having Government Land Grants and by the Hudson's Bay Company—*Concluded*

Year	Calgary and Edmonton Railway Company		Canadian Northern Railway Company		Great Northwest Central Railway Company		Total		Average per acre
	Acres	Amount	Acres	Amount	Acres	Amount	Acres	Amount	
		$		$		$		$	$ c.
1893....	11,260	.....	.....	.....	.....	.....	120,211	352,847	2 93
1894....	11,035	.....	.....	.....	.....	.....	68,668	207,856	3 02
1895....	46,815	.....	.....	.....	.....	.....	114,713	222,489	1 94
1896....	10,553	.....	.....	.....	.....	.....	108,016	361,338	3 34
1897....	9,436	.....	.....	.....	.....	.....	222,225	719,016	3 23
1898....	15,481	.....	.....	.....	.....	.....	448,623	1,431,774	3 18
1899....	24,738	53,335	.....	.....	.....	.....	462,494	1,520,792	3 28
1900....	46,653	128,256	.....	.....	.....	.....	648,379	2,125,146	3 27
1901....	116,719	352,037	.....	.....	.....	.....	621,027	2,088,269	3 36
1902....	323,494	1,033,396	.....	.....	.....	.....	2,201,795	7,746,958	3 56
1903....	231,800	909,600	183,736	631,503	128,435	522,490	4,229,011	14,651,757	3 46
1904....	129,007	563,507	64,469	313,575	41,858	177,081	1,267,187	5,564,240	4 39
1905....	109,191	512,898	231,707	1,221,469	17,593	103,564	990,005	5,046,572	5 09
1906....	85,784	480,063	204,966	1,014,351	20,003	137,503	1,642,684	9,871,241	6 01
*1907...	59,515	346,064	289,576	1,711,109	4,023	41,470	1,237,759	7,697,930	6 02
1908....	8,606	75,644	196,946	1,746,504	1,294	13,855	346,693	3,052,461	8 80
1909....	6,370	66,508	.....	.....	165	7,935	109,373	2,211,885	11 08
1910....	18,323	182,926	285,428	2,783,010	571	6,863	1,184,790	15,835,228	13 36
1911....	11,820	116,231	277,414	3,336,797	1,438	27,417	1,406,651	19,122,937	13 59
1912....	10,853	154,424	365,926	4,216,578	632	11,373	1,329,390	18,224,419	13 70
1913....	4,155	44,212	182,491	2,009,642	1,601	32,105	707,149	9,867,155	13 95
1914....	19,575	460,129	182,491	2,009,642	.....	.....	501,575	7,398,191	14 75
1915....	23,042	444,018	.....	.....	316	6,956	192,801	3,279,031	17 01
1916....	11,689	172,033	.....	.....	4,646	81,182	354,886	5,435,949	15 32
1917....	33,821	573,875	17,796	298,938	8,829	141,439	755,154	12,357,377	16 35
1918....	53,335	815,628	39,546	732,351	16,021	275,724	1,116,237	20,887,600	18 71
1919....	31,774	479,496	65,110	1,261,963	14,530	252,774	1,038,657	18,148,736	17 47
1920....	26,953	425,656	86,305	1,685,241	27,981	464,586	1,026,157	19,188,225	18 69
1921....	11,681	191,928	69,934	1,455,319	5,128	96,616	553,630	10,860,756	19 61
1922....	3,024	51,603	14,163	263,199	167	2,997	155,239	2,633,572	16 96
1923....	1,013	15,552	11,214	190,112	1,120	21,368	123,303	1,864,364	15 12
1924....	1,283	14,144	71,489	1,103,421	799	14,934	159,795	2,460,057	15 39
Totals..	1,508,798	8,663,163	2,840,707	27,984,724	297,150	2,440,241	25,484,277	231,436,168	9 08

*Nine months to March 31.

ACCOUNTS

STATEMENT of Gross Cash Receipts received from all sources for the fiscal year 1923-24, compared with the receipts for the previous fiscal year

Source of Revenue	1923–1924	1922–1923	Increase	Decrease	Net Decrease
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion lands	2,353,687 02	2,430,867 14	.....	77,180 12	
School lands	1,511,518 09	1,538,449 98	.....	26,931 89	
Ordnance lands	57,505 97	6,132 79	51,373 18		
Seed grain and relief	274,227 20	254,802 23	19,424 97		
Registrar's fees	603 30	454 00	149 30		
Fines and forfeitures	2,467 56	3,075 46	.....	607 90	
Casual revenue	28,317 00	20,060 18	8,256 82		
Sales of railway lands	.....	1,600 00	.....	1,600 00	
	4,228,326 14	4,255,441 78	79,204 27	106,319 91	27,115 64

STATEMENT of Cash Receipts on Account of Dominion Lands Revenue for the Fiscal Year 1923-24, Compared With the Receipts of the Previous Fiscal Year

Particulars	1923-1924	1922-1923	Increase	Decrease	Net Decrease
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Homestead fees	38,640 00	53,460 00		14,820 00	
Sale fees	30 00	80 00		50 00	
Improvements	28,012 15	34,828 44		6,816 29	
Pre-emption sales	336,116 44	341,288 86		5,172 42	
General sales	35,730 27	38,982 72		3,252 45	
Purchased homestead sales	29,046 58	28,624 97	421 61		
Patent and interchange fees	316 55	263 00	53 55		
Rentals of land	16,230 12	14,471 49	1,758 63		
Survey fees	25 24	31 67		6 43	
Map sales, office fees, etc	15,652 17	21,414 16		5,761 99	
D.L.S. Examination fees	20 00	180 00		160 00	
Suspense account	2,575 49	5,147 49		2,572 00	
Interim receipt account	625 65	197 00	428 65		
Liquor permit fees	261 50	231 40	30 10		
Traders licenses	1,927 00	1,180 00	747 00		
Trappers licenses	4,995 25	4,433 00	562 25		
Taxidermist licenses	74 00	67 15	6 85		
Marriage licenses	8 00		8 00		
Radio fees	593 43		593 43		
Miscellaneous	6,334 71	1,000 78	5,333 93		
Timber dues	$47,772 60	$25,465 05	22,307 55		
Grazing fees	1,579 45		1,579 45		
Grazing rental	140,291 60	153,697 11		13,405 51	
Grazing improvements	3,918 10	2,019 50	1,898 60		
Hay permits	16,932 25	21,718 43		4,786 18	
Irrigation sales	3,865 95	5,005 16		1,139 21	
Irrigation fees	425 00	601 00		176 00	
Fishing permits	1,664 00	1,411 00	253 00		
Ice permits	55 00	75 00		20 00	
Sales of trees, etc	5,382 82	3,037 96	2,344 86		
Coal lands	405,902 85	355,325 65	50,577 20		
Mining fees	67,960 08	86,825 52		18,865 44	
Dredging leases	949 78	604 30	345 48		
Petroleum leases	175,325 51	305,770 00		130,444 49	
Potash leases	1,115 41	736 55	378 86		
Quarrying leases	7,363 47	6,354 31	1,009 16		
Sand, stone and gravel permits	453 76	1,673 55		1,219 79	
Rent of water-power	6,125 34	4,008 34	2,117 00		
Quartz leases	3,416 59	3,770 00		353 41	
Quartz sales	192 76	377 25		184 49	
Export tax on gold	28,409 23	25,819 04	2,590 19		
Free certificates for export of gold	16 50	16 50			
Hydraulic leases	2,265 00	5,436 35		3,171 35	
Antelope park	28 00	572 80		544 80	
Brereton Lakes park	20 00		20 00		
Buffalo park	30,747 24	130 00	30,617 24		
Elk Island park	74 50	98 50		24 00	
Fort Anne park	35 00	31 00	4 00		
Fort Edward park	25 00		25 00		
Glacier park	390 18	405 32		15 14	
Jasper park	6,266 43	5,708 80	557 63		
Kootenay park	3,832 20	88 20	3,744 00		
Moose Mount. Buffalo reserve		55 20		55 20	
Point Pelee park	28 00	3 00	25 00		
Rocky Mountains park	66,756 06	62,975 25	3,780 81		
Vidal's Point park	18 00	27 00		9 00	
Waterton Lakes park	4,491 48	3,472 83	1,018 65		
Yoho park	2,377 33	1,669 54	707 79		
	2,353,687 02	2,430,867 14	135,845 47	213,025 59	77,180 12
Refunds	71,983 12	83,151 71		11,168 59	11,168 59
	2,281,703 90	2,347,715 43	135,845 47	201,857 00	66,011 53

Statement Showing Receipts on Account of Dominion Lands from July 1, 1872, to March 31, 1924

Fiscal Year	Homestead Fees	Pre-emption Fees	Improvements	Sales		Map sales, Office and Registration Fees	Dominion Lands Surveyors' Examination Fees	Rents, Survey Fees, Miscellaneous, and Suspense Account	Purchased, Homestead Inspection, Cancellation and Sundry Fees	Timber Dues
				Cash	Scrip					
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73	6,960 00			19,170 20						109 25
1873-74	7,310 00			19,834 75				125 50		2,710 55
1874-75	11,510 00			13,666 90		129 00				2,335 25
1875-76	4,680 00			3,478 94	320 00					387 00
1876-77	2,250 00			1,085 86	136,955 16	4 00		100 00	40 00	320 00
1877-78	14,540 00			2,794 86	120,159 54		180 00		290 00	1,620 00
1878-79	17,690 00			4,998 39	210,904 84	81 00	310 00	13 70	410 00	325 00
1879-80	41,255 00	10,241 43		45,708 97	81,685 86	245 40	580 00	183 25	1,780 00	25,121 46
1880-81	20,450 00	10,801 75	269 00	71,170 17	70,828 30	985 40	420 00	37 58		32,028 34
1881-82	54,155 00	39,843 90	1,758 00	1,240,328 27	50,590 84	3,036 45	890 00	58 10		58,753 14
1882-83	73,015 00	54,725 00	7,114 91	516,092 21	33,638 40	3,109 50	890 00	501 77		90,066 46
1883-84	41,580 00	28,810 00	2,596 11	424,863 36	40,919 67	1,289 55	530 00	45,766 53	1,713 45	147,983 10
1884-85	25,645 00	17,100 00	2,328 75	199,275 32	45,875 60	1,621 82	370 00	50,068 57	2,685 00	87,474 99
1885-86	26,110 00	14,371 00	1,101 50	76,140 41	214,657 97	1,339 34	360 00	20,070 00	5,025 00	64,820 31
1886-87	19,614 00	6,887 93	1,971 55	48,175 76	337,640 19	1,171,39	240 00	44,561 00	7,778 40	65,111 74
1887-88	23,691 00	4,830 00	1,918 35	52,238 36	313,522 67	1,660 75	240 00	20,591 41	12,078 53	94,964 55
1888-89	39,460 00	10,550 00	4,128 48	57,513 16	318,238 57	1,410 16	220 00	10,389 57	20,402 50	90,290 00
1889-90	35,920 00	8,580 00	3,250 54	54,896 85	228,744 47	2,099 07	190 00	3,316 23	21,715 00	84,642 95
1890-91	29,164 10		6,302 61	91,664 98	171,425 14	1,854 78	88 00	7,951 05	16,790 00	102,902 71
1891-92	46,994 00		6,472 31	111,651 01	97,822 41	2,147 31	135 00	29,898 49	27,964 00	106,461 35
1892-93	37,689 74		7,113 50	96,171 67	77,231 18	975 20	82 00	18,509 35	22,015 00	105,865 24
1893 94	36,462 26		3,497 76	53,254 71	27,840 96	973 11		13,457 09	11,097 00	81,290 51
1894-95	29,664 88		3,567 90	37,293 71	23,269 62	695 99	40 00	6,271 77	6,566 90	74,079 20
1895-96	18,278 00		3,163 15	46,373 98	46,929 65	610 78	50 00	21,679 31	6,810 50	61,923 47
1896-97	21,179 00		3,737 01	49,335 53	16,929 38	795 05	70 00	11,129 72	8,527 50	68,992 82
1897-98	34,780 00		5,649 63	80,178 64	28,918 14	1,987 40	10 00	15,376 53	15,859 88	119,313 78
1898-99	58,235 00		4,297 62	116,594 35	21,307 58	1,266 05	20 00	67,450 95	20,850 40	155,360 63
1899-1900	72,690 00		4,835 81	103,247 58	88,756 22	1,258 85	190 00	31,154 04	21,688 60	126,345 82
1900-01	79,910 00		5,213 22	40,360 93	326,270 03	3,874 14	165 00	70,499 54	12,874 00	209,399 32
1901-02	144,425 00		8,481 46	66,950 21	169,767 13	5,792 96	370 00	71,993 30	663 00	207,790 90
1902-03	320,409 65		11,829 08	155,537 49	158,452 66	5,911 96	365 00	125,128 66	595 00	470,916 93
1903 04	255,772 36		15,119 47	196,750 15	189,705 08	5,549 13	463 50	81,246 46	1,081 00	397,344 33
1904-05	304,806 25		21,571 25	154,128 04	19,644 59	4,879 13	906 50	144,854 31	1,271 00	266,951 46
1905-06	417,834 25		31,795 19	442,588 69	7,654 57	6,042 34	474 00	141,345 30	1,046 25	292,684 53
1906-07 (9 months)	215,449 55		39,765 63	503,202 44	11,349 89	5,449 06	420 00	60,450 99	685 00	379,476 32
1907-08	301,693 73		71,139 47	656,303 03	92,311 24	7,727 29	690 00	148,914 00	1,283 50	473,608 94
1908 09	389,039 00	141,550 15	70,928 86	951,442 28	20,136 27	7,296 55	1,040 00	75,596 96	9,579 50	269,837 52

1909–10	415,232 00	174,250 00	105,009 07	1,239,037 33	9,973 84	9,135 49	1,500 00	99,967 27	14,028 36	377,856 45
1910–11	445,135 00	156,485 00	143,227 13	1,193,756 04	1,437 84	8,730 01	1,316 00	42,111 92	20,142 85	387,054 96
1911–12	391,703 12	102,070 00	184,825 92	1,967,182 85	3,256 99	11,239 14	1,400 00	44,280 89	14,745 50	400,668 61
1912–13	337,055 00	85,940 00	168,904 42	1,650,491 87	6,157 27	14,483 91	1,040 00	17,866 65	11,380 00	463,738 75
1913–14	317,412 00	61,660 00	187,052 46	1,303,587 54	240 00	16,056 07	1,350 00	40,148 65	8,402 00	378,365 33
1914–15	238,295 00	28,720 00	114,982 17	696,672 23	80 00	14,290 23	970 60	33,234 14	4,776 10	310,934 29
1915–16	170,350 00	22,760 00	112,782 70	1,090,842 36	.....	11,485 83	470 00	19,495 98	3,475 00	378,960 68
1916–17	112,110 20	14,690 00	112,711 33	2,707,203 99	332 61	13,976 95	560 00	21,212 91	2,910 00	429,403 09
1917–18	83,180 00	7,870 00	89,371 59	3,046,091 55	131 47	12,066 22	250 00	26,513 84	2,200 00	482,006 25
1918–19	42,190 00	.....	49,225 97	2,192,860 81	323 41	11,039 54	100 00	77,291 91	360 00	408,728 28
1919–20	67,460 00	.....	78,913 74	2,799,605 09	80 00	17,134 19	255 00	28,535 19	340 00	589,780 21
1920 21	53,880 00	.....	70,492 66	1,721,171 61	.....	16,333 67	200 00	23,149 23	370 00	705,313 77
1921–22	73,540 00	.....	56,084 83	761,849 89	.....	23,352 07	170 00	26,285 90	3,713 00	683,490 99
1922 23	53,460 00	.....	36,847 94	414,278 96	900 00	21,414 16	180 00	20,848 43	6,187 40	825,465 05
1923 24	38,640 00	.....	31,930 25	404,952 00	160 00	15,652 17	20 00	25,791 21	8,131 73	847,772 60
Totals	6,119,954 09	1,002,736 16	1,893,278 30	29,994,046 28	3,823,477 25	299,659 56	20,774 60	1,885,425 15	362,327 69	12,489,149 18

STATEMENT Showing Receipts on Account of Dominion Lands from July 1, 1872, to March 31, 1924—*Concluded*

Fiscal Year	Grazing Lands		Hay, Coal, Mining Fees, Stones Quarries, Export Tax on Gold etc.		Canadian National Parks	Colonization Lands		Gross Revenue	Refunds	Net Revenue
	Cash	Scrip	Cash	Scrip		Cash	Scrip			
	$ cts.	$ cts	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73								26,239 45		26,239 45
1873-74								29,980 80		29,980 80
1874-75								27,641 15		27,641 15
1875-76								8,865 94		8,865 94
1876-77								140,755 02		140,755 02
1877-78								139,584 40		139,584 40
1878-79								234,732 93		234,732 93
1879-80								206,801 37	4,636 08	202,165 29
1880-81								206,990 54	5,038 22	201,952 32
1881-82	2,245 00		40 00			354,036 17		1,805,734 87	10,687 55	1,795,047 32
1882-83	22,844 43		913 91			248,492 01		1,651,403 60	8,746 05	1,042,657 55
1883-84	11,370 60		640 00			253,713 40		1,001,776 67	9,220 50	992,556 17
1884-85	17,089 75		815 63			1,214 22		451,564 65	12,070 85	439,493 80
1885-86	29,562 51	3,131 08	1,284 83					457,973 95	63,389 12	394,584 83
1886-87	14,242 77	39,487 67	1,570 40	80 00				588,532 80	19,543 16	568,989 64
1887-88	5,922 47	23,023 28	2,273 73	80 00	2,951 58		10,000 00	569,986 68	6,277 66	563,709 02
1888-89	2,207 69	16,802 63	3,946 55		2,528 73		16,000 00	594,088 04	5,226 23	588,861 81
1889-90	1,305 57	9,021 63	9,242 08		1,094 37			464,018 76	8,209 74	455,809 02
1890-91	3,679 55	16,193 77	8,628 44	160 00	2,397 35	5 28	4,460 50	463,068 26	7,195 27	455,872 99
1891-92	3,726 80	17,222 60	5,616 85		3,648 45			459,760 58	15,291 39	444,469 19
1892-93	6,380 80	11,542 39	6,266 13		4,983 23			394,825 93	18,314 97	376,510 96
1893-94	5,740 79	7,687 86	6,243 15		2,523 92			250,069 12	4,544 01	245,525 11
1894-95	5,353 72	8,628 00	5,229 54		2,321 87			202,983 10	4,365 99	198,617 11
1895-96	7,071 86	6,255 90	5,813 51		2,734 82			227,694 93	8,368 79	219,326 14
1896-97	4,715 01	2,500 00	8,633 68		2,132 11			198,676 81	6,833 78	191,843 03
1897-98	4,728 58	510 39	699,383 01		3,015 65			1,009,741 63	4,678 55	1,005,063 08
1898-99	5,215 88		1,130,705 70		2,991 16			1,584,328 32	32,296 39	1,552,031 93
1899-1900	8,382 86	4,083 30	1,068,362 92	20 00	2,727 65			1,503,743 05	23,062 28	1,480,680 77
1900-01	4,726 28	14,671 99	1,102,127 33	20 00	4,047 31			1,874,159 09	18,368 85	1,855,790 24
1901-02	7,292 46	8,409 27	737,882 43		*2,861 13			1,432,679 25	27,165 55	1,405,513 70
1902-03	13,911 73	15,041 33	607,723 65		*5,063 69			1,890,886 83	21,519 84	1,869,366 99
1903-04	19,790 27	13,921 29	495,583 18		*9,498 48			1,681,824 70	36,721 75	1,645,102 95
1904-05	36,145 32	5 237 36	364,927 59		*14,059 55			1,339,382 35	25,786 90	1,313,595 45
1905-06	51,583 89	80 00	297,302 44		18,883 83			1,709,315 28	33,418 36	1,675,896 92
1906-07 (9 months)	43,711 91	400 00	214,257 10		*15,887 12			1,490,503 31	35,117 48	1,455,385 83
1907-08	43,211 78	4,048 01	266,415 31		27,232 87			2,094,579 17	115,080 04	1,979,499 13
1908-09	55,312 79	3,257 84	253,339 17		31,321 20			2,277,678 09	102,463 78	2,175,214 31
1909-10	67,807 01	5,081 47	459,870 29		43,697 61			3,022,446 13	121,431 15	2,901,014 98
1910-11	60,702 80	2,356 00	774,569 27		69,054 59			3,306,073 41	198,689 47	3,107,383 94
1911-12	69,519 41	1,520 00	729,126 56		56,497 74			3,978,036 73	197,631 35	3,780,405 38

1912-13	79,412 76	.....	779,695 53	1,587 32	37,448 72	.....	.....	3,655,202 20	246,105 26	3,409,096 94
1913-14	84 926 15	320 00	865,499 12	.....	48,800 33	.....	.....	3,313,819 65	277,309 33	3,036,510 32
1914-15	101,710 58	400 00	1,594,905 42	.....	37,895 97	.....	.....	3,177,866 73	317,764 75	2,860,101 98
1915-16	118,955 02	160 00	476,408 82	.....	37,493 53	.....	.....	2,443,639 92	143,942 57	2,299,697 35
1916-17	128,341 50	.....	600,934 13	.....	45,851 45	.....	.....	4,190,238 16	134,243 14	4,055,995 02
1917-18	125,330 49	240 00	650,427 95	.....	52,160 52	.....	.....	4,557,810 08	113,680 44	4,444,129 64
1918-19	148,179 55	.....	630,975 74	.....	55,006 72	.....	.....	3,616,281 93	76,031 62	3,540,250 91
1919-20	183,661 96	.....	896,443 40	.....	76,742 07	.....	.....	4,748,920 85	116,249 03	4,622,671 82
1920-21	183,756 97	.....	1,234,558 49	.....	76,850 09	.....	.....	4,086,076 49	130,750 93	3,955,325 56
1921-22	144,344 67	.....	1,071,335 36	.....	74,502 68	.....	.....	2,918,529 59	119,079 58	2,799,450 01
1922-23	153,697 11	.....	823,186 50	.....	75 304 59	.....	.....	2,431,767 14	83,151 71	2,348,615 43
1923-24	141,871 05	.....	723,762 39	.....	115,163 42	.....	.....	2,353,847 02	71,983 12	2,281,863 90
Totals.....	2,227,090 30	241,235 06	19,566,895 53	1,917 32	1,067,209 40	857,461 08	30,460 50	81,883,127 45	3,041,681 98	78,841,445 47

*Including Scrip.

STATEMENT Showing Yearly the Gross Cash Revenue from all Sources from July 1, 1904, to March 31, 1924

Fiscal Year	Dominion Lands	School Lands	Seed Grain	Ordnance Lands	Fines and Forfeitures	Registration Fees	Casual Revenue	Chinese Immigration Revenue	Total
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1904–1905	1,314,485 40	332,914 48	16,471 34	10,346 90	10.018 49	123,082 86	4,258 14	.....	1,811,597 61
1905-06	1,701,580 71	608,960 79	12,577 29	10,893 17	3,304 77	180,310 73	8,496 09	.....	2,526,123 55
1906-07	1,478,749 51	724,353 73	10,850 06	6,663 90	21 00	46,124 20	11,785 81	.....	2,278,548 21
1907-08	1,998,219 92	708,045 83	12,899 84	8,674 95	1,650 00	2,256 65	20,069 03	.....	2,751,816 22
1908-09	2,254,283 98	687,422 74	53,590 86	205,749 96	281 00	1,352 13	26 224 29	.....	3,228,904 96
1909-10	3,007,390 82	1,292,259 95	175,152 72	189,902 48	211 00	1,471 49	42,625 96	.....	4,709,014 42
1910–11	3,302,279 57	1,614,733 93	153,351 14	6,009 34	4,052 22	1,378 19	11,336 06	.....	5,093,140 45
1911–12	3,973,259 74	1,594,533 96	119,634 13	11,566 46	10,510 48	1,066 05	32,824 65	971,339 00	6,714,734 47
1912–13	3,647,457 61	1,621,508 11	171,342 87	60,607 80	7,150 35	1,241 25	22.873 55	3,549,242 00	9,081,423 54
1913-14	3,313,259 65	1,215,822 37	176,736 89	5,805 98	7,888 50	966 50	27,884 47	2,644,593 00	7,392,957 36
	25,990,966 91	10,400,555 89	902,607 14	516,220 94	45,087 81	359,250 05	208,378 05	7,165,174 00	45.588,240 79
1914–15	3,177,386 73	943,717 00	68,263 56	4,416 64	5,828 60	969 85	11,738 10	588,124 00	4,800,443 88
1915–16	2,443,479 92	934,965 37	2,525,528 50	5,997 98	3,075 21	908 15	28,002 62	19,389 00	5,961,346 75
1916–17	4,189,905 55	1,699,370 06	3,652,729 05	5,553 26	2,184 72	796 85	15,618 26	140,487 00	9,706,644 75
1917–18	4,557,438 61	2,836,216 40	2,613,708 67	7,929 75	3,686 60	562 25	9,074 15	336,757 00	10,365,372 83
1918–19	3,615,958 52	5,087,875 81	1,378,275 76	4,819 27	35 00	789 22	12,381 71	.....	10,100,135 29
1919–20	4 738 840 85	3 900 091 75	1 155 354 64	9 840 33	70 00	430 78	22 837 87	.....	9 827 466 22
1920-21	4 086,076 49	4,480,270 67	773,200 67	8,887 88	1,139 75	448 31	811,970 45	.....	10,161,994 22
1921-22	2,918,529 59	2,335 726 83	372,350 89	8,446 48	2,912 73	524 64	20,128 63	.....	5,658,619 79
1922-23	2,430,867 14	1.538,449 98	254,802 23	6,132 79	3,075 46	454 00	20,060 18	.....	4,253,841 78
1923-24	2,353,687 02	1,511,518 09	274,226 90	57,505 97	2,467 56	603 30	28,317 00	.....	4,228,325 84
	34,512,170 42	25,268,201 96	13,068,440 87	119,530,35	24,474 43	6,487 35	980,128 97	1,084,757 00	75,064,191 35
Increase	8,521,203 51	14,867,646 07	12,165,833 73	.....	.....	.....	771,750 92	.....	29,475,950 56
Decrease	.....	.....	.....	396,690 59	20,613 38	352,762 70	.....	6,080,417 00	

PART I

DOMINION LANDS

REPORT OF THE COMMISSIONER, J. W. GREENWAY

Applications for Patent	1922-23	1923-24
Number examined	33,235	26,359
New applications	5,544	4,132
Applications accepted and notifications issued	4,835	3,290
Certificates of recommendation sent out	508	208

REPORT OF SUPERINTENDENT WESTERN LANDS AGENCIES, H. G. CUTTLE

AGENCIES

Agency	Homestead entries granted	Land Sales	Applications for patent received	Land entries cancelled	Permits Issued	
		Ordinary and School lands			Timber	Hay
Manitoba —						
Dauphin	314	43	213	333	523	283
The Pas*	Mining	locations	(580)	Assessment	payments	(44)
Winnipeg	317	52	393	523	.....	.....
Saskatchewan						
Battleford	159	7	107	374	100	527
Moose Jaw	79	29	728	948	42	695
Prince Albert	1,308	53	554	938	1,136	559
Saskatoon	139	5	162	304	4	529
Swift Current	13	4	192	332	21	199
Alberta—						
Calgary	147	27	212	423	552	404
Edmonton	942	108	624	1,305	1,455	1,295
Grande Prairie	94	12	224	133	178	317
Lethbridge	21	11	174	313	356	46
Peace River	142	13	167	299	248	386
British Columbia—						
Kamloops	78	17	80	68	351	33
New Westminster	86	8	21	142	.....	.....
Revelstoke (6 mos.)	16	4	10	24	47	.....
Totals	3,855	393	3,861	6,459	5,013	5,273

NOTE.—The above figures are subject to change because of possible disallowance of entry.
*The Pas Office is that of a Mining Recorder who is also Sub-Agent.

83305—12—3

HOMESTEAD INSPECTORS, PRINCIPAL WORK PERFORMED BY

Headquarters	Name	Land Inspections made	Applications for patent	Miles Travelled	
				Wagon	Road
Manitoba—					
Dauphin	G. L. Speers	604	94	4,194	11,367
"	W. J. Mayberry	700	121	6,746	2,424
Winnipeg	L. Lepine	372	49	3,858	7,146
"	W. Lagimodière	301	60	3,895	3,284
"	W. D. Gillespie	243	15	3,415	2,262
"	J. F. Drew	219	68	2,492	4,674
Saskatchewan—					
Battleford	D. Anderson	214	27	5,575	25
"	N. F. Leach	279	40	4,285	390
Moose Jaw	C. E. Barr	532	110	7,378	1,183
"	A. Hamilton	666	27	6,054	9,581
"	A. E. Henke	487	44	8,520	2,765
"	J. C. DeBalinhard	754	75	8,433	11,364
"	J. Furnis	769	17	8,787	786
"	J. C. McDonald	1,060	140	8,887	1,610
"	J. A. Lydiard	1,728	54	6,595	2,136
Prince Albert	W. J. Morrison	268	31	2,794	2,371
"	S. Taylor	281	13	7,049	4,409
"	E. H. E. Webb-Bowen	373	108	4,048	4,214
"	W. W. Whelan	297	72	8,125	1,564
"	A. E. Mosses	808	67	8,444	312
"	A. Smyth	523	10	7,936	5,480
Swift Current	W. Shields	108	20	1,606	.....
Alberta—					
Calgary	G. H. Cloakey	1,563	10	7,853	1,331
"	G. W. Fleming	1,267	99	4,861	3,380
"	R. A. Kembry	1,023	50	12,127	3,355
"	W. Tempany	1,227	29	11,328	1,228
Edmonton	T. J. Cunningham	310	14	4,705	3,603
"	I. S. Doze	449	34	5,074	2,369
"	S. C. Hagen	343	71	4,310	3,310
"	J. A. Horne	315	34	4,670	2,700
"	A. McConnochie	383	87	3,311	5,802
"	P. E. Tayler	29	4	213	87
Grande Prairie	T. M. Newton	402	55	7,422	.....
"	L. T. Smith	380	71	7,112	.....
Lethbridge	H. L. Bowyer	392	15	3,801	2,002
"	H. O. McCowan	625	23	5,351	980
"	J. Newcombe	1,315	12	4,838	2,328
"	D. E. Wilcox	1,529	121	11,708	1,509
Peace River	A. E. Key	254	2	1,967	4,147
"	J. E. McMullen	247	43	4,308	1,004
British Columbia—					
Kamloops	J. M. Benzie	386	62	5,496	2,968
"	H. Cook	63	19	665	6,350
Totals		24,088	2,117	240,236	127,800

SESSIONAL PAPER No. 12

REVENUES COLLECTED AT DOMINION LANDS AGENCIES, CLASSIFIED UNDER THE VARIOUS HEADINGS

Agency	Agent	Land Patents Branch	Timber and Grazing Branch	Forestry Branch	Reclamation Branch
		$ cts.	$ cts.	$ cts.	$ cts.
Manitoba—					
Winnipeg	L. P. O. Noel	7,573 05	451 77		
Dauphin	E. Widmeyer	5,891 99	8,427 60	17,026 45	
The Pas	W. B. McLellan				
Saskatchewan—					
Moose Jaw	J. A. Reid	219,786 79	31,004 59	11,912 96	
Prince Albert	L. C. Patterson	16,508 97	95,621 56	32,309 00	1 70
Saskatoon	L. C. Patterson	11,221 70	1,209 64	1,373 90	
Battleford	L. C. Patterson	6,266 74	2,806 19	2,709 40	
Alberta—					
Calgary	E. H. Crockett	50,160 51	43,457 25	12,378 73	116 90
Edmonton	A. Norquay	19,846 02	143,568 06	15,748 96	1,537 25
Lethbridge	G. A. Nicholson	20,810 93	24,945 99	14,897 08	
Peace River	R. Cruickshank	2,683 54	5,360 94	13 00	
Grande Prairie	F. L. Christie	3,242 34	2,764 76		133 20
British Columbia—					
Kamloops	J. A. Bannerman	4,924 59	88,460 32	3,263 31	
New Westminster	W. D. Cowell	3,968 37			

REVENUES COLLECTED AT DOMINION LANDS AGENCIES (*Concluded*)

Agency	Agent	Mining Lands Branch	School Lands Branch	Miscellaneous	Total
		$ cts.	$ cts.	$ cts.	$ cts.
Manitoba—					
Winnipeg	L. P. O. Noel	12,383 43	5,014 46	2,524 78	27,947 49
Dauphin	E. Widmeyer	8,269 73	2,619 22	336 38	42,571 37
The Pas	W. B. McLellan	20,788 44			20,788 44
Saskatchewan—					
Moose Jaw	J. A. Reid	10,550 62	85,770 85	90,799 33	149,825 14
Prince Albert	L. C. Patterson	201 16	21,779 39	12,921 58	209,343 36
Saskatoon	L. C. Patterson	243 86	6,661 38	3,741 70	24,452 18
Battleford	L. C. Patterson	869 00	2,080 81	971 07	15,703 21
Alberta—					
Calgary	E. H. Crockett	125,110 64	39,839 28	10,778 30	281,841 01
Edmonton	A. Norquay	179,291 06	22,368 30	3,030 25	385,389 90
Lethbridge	G. A. Nicholson	95,880 27	29,508 35	10,248 49	196,291 11
Peace River	R. Cruickshank	6,727 13	1,352 49	465 94	16,603 04
Grande Prairie	F. L. Christie	439 11	1,154 56	1,477 01	9,210 98
British Columbia—					
Kamloops	J. A. Bannerman	899 25			97,047 47
New Westminster	W. D. Cowell	15,239 16			19,207 53

83305—12—3½

REPORT OF THE CONTROLLER OF THE LAND PATENTS BRANCH AND REGISTRAR OF DOMINION LANDS PATENTS, N. O. COTE

With statements, A to K in relation thereto

LETTERS PATENT

The number of letters patent issued was 5,317, covering an area of 791,401 acres, which may be classified as follows:—

Province	Patents	Acres
Manitoba	763	112,185
Saskatchewan	2,473	398,759
Alberta	1,841	257,809
British Columbia	223	21,970
Yukon Territory	13	649
Northwest Territories	4	29
Totals	5,317	791,401

These grants are given in detail in the statements marked A to G, inclusive, and may be summarized as follows:—

Grants	Patents	Acres
Homesteads	2,814	434,303
Sales	506	39,961
Pre-emptions	480	75,816
Purchased homesteads	81	10,902
Railways	180	43,617
Special grants	954	141,510
Northwest Halfbreeds	15	2,401
Licenses of occupation	6	31
Soldier grants	278	42,749
Hudson's Bay Company	3	111
Totals	5,317	791,401

There was a decrease of 1,656 letters patent and a decrease in the area patented of 991,558 acres, as compared with the previous year.

There are recorded in the Land Patents Branch 458,621 letters patent, aggregating 102,182,298 acres, which have been issued since May, 1873, to March 31, 1924.

LANDS DISPOSED OF

Three thousand eight hundred and forty-three (3,843) homestead entries were granted, aggregating an approximate area of 614,880 acres, made up by provinces as follows: Manitoba, 632; Saskatchewan, 1,699; Alberta, 1,326; British Columbia, 186; total, 3,843.

There was a decrease of 1,500 in the number of homestead entries granted, as compared with the previous year.

By land agencies the 3,843 homestead entries are made up as follows:—

Manitoba.—Dauphin, 315; Winnipeg, 317; total, 632.

Saskatchewan.—Battleford, 159; Moose Jaw, 79; Prince Albert, 1,308; Saskatoon, 139; Swift Current, 14; total, 1,699.

Alberta.—Calgary, 148; Edmonton, 942; Grande Prairie, 94 (including 12 in Peace River Block, B.C.); Lethbridge, 21; Peace River, 142 (including 9 in Peace River Block, B.C.); total, 1,347.

British Columbia.—Railway Belt-Kamloops, 77; New Westminster, 72; Revelstoke, 16, total, 165.

The Dominion Lands offices at Battleford, Saskatoon, and Swift Current were closed on the 22nd September, 1923, and the whole of the province of Saskatchewan was then divided between Moose Jaw and Prince Albert land districts, the dividing line being the south boundary of township thirty-one.

The Dominion Lands office at Revelstoke, B.C., was closed on the 29th September, 1923, and the territory formerly included in this agency was added to Kamloops land district.

The 3,843 homestead entrants represented 8,804 persons as compiled from information obtained from each entrant. Of these entries 1,277 were made by residents of the several provinces of the Dominion; 590 by persons who had previously obtained homestead entries, but which had been cancelled by default or at the request of the entrants in order, in most cases, to enter for other lands; 553 were made by persons from the British Isles; 639 by persons from the United States; 303 by Austro-Hungarians; 112 by Russians and Finns; 67 by Norwegians; 93 by Swedes; 29 by Germans; 23 by Frenchmen; 9 by Belgians; and the remaining 148 were made up of citizens of various other countries.

There were 710 soldier grant entries made during the year, aggregating approximately 113,600 acres, made up as follows:—

	Number of entries	Acres
Manitoba	142	22,720
Saskatchewan	349	55,840
Alberta	187	29,920
British Columbia (Railway Belt and Peace River Block)	32	5,120
Totals	710	113,600

By land agencies the soldier grant entries were as follows:—

Manitoba.—Dauphin, 84; Winnipeg, 58; total, 142.

Saskatchewan.—Battleford, 25; Moose Jaw, 107; Prince Albert, 190; Saskatoon, 18; Swift Current, 9; total, 349.

Alberta.—Calgary, 34; Edmonton, 96; Grande Prairie, 25 (including 6 in the Peace River Block, B.C.); Lethbridge, 10; Peace River, 28; total, 193.

British Columbia.—Railway Belt—Kamloops, 12; New Westminster, 9; Revelstoke, 5; total, 26.

CANCELLED ENTRIES

There were cancelled 6,222 entries, as follows:—

	Manitoba	Saskatchewan	Alberta	British Columbia
Homesteads	759	1,499	1,722	207
Soldier grant entries	145	242	250	13
Pre-emptions	11	823	301	
Purchased homesteads		75	18	4
Sales	10	90	73	
Totals	925	2,729	2,344	224

SALES

Three hundred and thirty-four (334) sales were made for 8,831 acres of land, with an average for each sale of about 26½ acres.

REVENUE

The sum of $396,845.06, including $143,292.35 interest on deferred payments, was received on account of purchased homesteads, pre-emptions and ordinary sales, showing a decrease of $1.960.05 as compared with the payments received during the previous year.

The sum of $71.406.41 has also been received for entry fees, improvements and sundries, making a total revenue for the fiscal year of $468,251.47.

REFUNDS

There were 521 refunds made, amounting to $22,361.62, as follows:—

406 refunds—Value of improvements collected on cancelled homesteads	$	18,914 93
115 refunds—Overpayments on sales; and of moneys paid on account of purchased homesteads and pre-emption sales, entries for which have been cancelled		3,446 69
Total	$	22,361 62

NEWLY SURVEYED LANDS THROWN OPEN TO HOMESTEAD ENTRY

Newly surveyed lands comprised in fifty-nine townships were made available for homestead entry in the following land agencies:—

Manitoba.—Dauphin, in 18 townships; Winnipeg, 12; total, 30.

Saskatchewan.—Battleford, in 1 township; Prince Albert, 4; Moose Jaw, 5; total, 10.

Alberta.—Peace River, in 4 townships; Edmonton, 6; Grande Prairie, 3; Lethbridge, 3; Calgary, 3; total, 19.

SESSIONAL PAPER No. 12

STATEMENT A.—Letters patent issued covering Dominion Lands in Manitoba, Saskatchewan, Alberta, Northwest Territories, British Columbia and the Yukon Territory

No.	Nature of Grant	From April 1, 1923, to March 31, 1924		From April 1, 1922, to March 31, 1923	
		Patents	Acres	Patents	Acres
1	British Columbia homesteads	89	9,712	143	16,214
2	British Columbia sales	23	255	21	789
3	Coal lands sales			1	288
4	Coal surface sales			1	40
5	Commutation grants	1	98		
6	Drainage sales	3	478		
7	Homesteads	2,680	417,522	4,609	718,649
8	Homesteads, Peace River Block	42	6,433	73	11,386
9	Hudson's Bay Co	3	111	1	147
10	License of occupation	6	31	76	3,371
11	Manitoba Act grants	1	42	1	40
12	Military homesteads	1	320		
13	Mining lands sales	6	285	13	607
14	Mineral rights (183 acres)	2		1	
15	Northwest half-breed grants	15	2,401	7	1,366
16	Parish sales	4	592	5	442
17	Petroleum and Natural Gas, surface sales			1	7
18	Pre-emption sales	480	75,816	561	88,320
19	Purchased homesteads	81	10,902	95	13,975
20	Quit claim, sales	3	70	8	266
21	Quit claim, drainage sales	1	76		
22	Quit claim, special grants	239	37,009	48	7,189
	Railways—				
23	Alberta and Great Waterways Railway Co.	37	487	68	1,117
24	Calgary and Edmonton Railway Co	1	321	2	317
25	Canadian Northern Railway Co	77	39,168	135	792,005
26	Canadian Northern Alberta Railway Co	1	3		
27	Canadian Northern Pacific Railway Co			1	2
28	Canadian Northern Saskatchewan Railway Co			2	17
29	Canadian Northern Western Railway Co	9	34	22	302
30	Canadian Pacific Railway grants	28	2,542	19	1,608
31	Canadian Pacific Railway roadbed and station grounds	11	175	11	88
32	Central Canada Railway Co			4	26
33	Edmonton Dunvegan and British Columbia Railway Co	1	5	2	26
34	Grand Trunk Pacific Railway Co	6	38	1	12
35	Grand Trunk Pacific Branch Lines Co			6	68
36	Kettle Valley Railway Co			9	250
37	Manitoba and Northwestern Railway Co	2	253	1	3
38	Manitoba Southeastern Railway Co	4	192		
39	Nicola, Kamloops and Similkameen Railway Co	1	9	12	28
40	Qu'Appelle, Long Lake, and Saskatchewan Railroad and Steamboat Co	2	390		
41	Sales	218	6,166	260	14,398
42	Sales, Peace River Block	3	43	1	14
43	School lands sales	232	31,663	332	54,024
44	Soldier grants	272	41,781	141	21,490
45	Soldier grants, Peace River Block	6	968		
46	Special grants	701	102,546	291	33,716
47	Special grants, Peace River Block	12	1,815		
48	Yukon Territory homesteads	2	316	1	160
49	Yukon Territory sales	11	333	7	192
	Totals	5,317	791,401	6,973	1,782,959

STATEMENT B.—Letters patent issued, Dominion Lands in Manitoba

No.	Nature of Grant	From April 1, 1923 to March 31, 1924		From April 1, 1922 to March 31, 1923	
		Patents	Acres	Patents	Acres
1	Commutation grants	1	98	.....	.....
2	Homesteads	498	76,439	970	149,243
3	Manitoba Act grants	1	42	1	40
4	Mining lands sales	5	235	9	407
5	Parish sales	3	432	4	397
6	Pre-emption sales	.....	.....	1	160
7	Quit claim, special grants	3	480	6	590
	Railways—				
8	Canadian Northern Railway Co	16	6,570	5	14
9	Canadian Pacific Railway grants	11	39	.....	.....
10	Canadian Pacific Railway roadbed and station grounds	.....	.....	3	5
11	Manitoba and Northwestern Railway Co	2	253	.....	.....
12	Sales	45	679	47	3,288
13	School lands sales	41	6,369	55	9,814
14	Soldier grants	24	3,867	14	2,187
15	Special grants	113	16,682	85	11,063
	Totals	763	112,185	1,200	177,208

STATEMENT C.—Letters patent issued, Dominion Lands in Saskatchewan

No.	Nature of Grant	From April 1, 1923, to March 31, 1924		From April 1, 1922, to March 31, 1923	
		Patents	Acres	Patents	Acres
1	Homesteads	1,059	166,315	1,865	292,228
2	Hudson's Bay Co	1	50	.....	.....
3	License of occupation	3	13	9	30
4	Mining lands sales	1	50	.....	.....
5	Northwest half-breed grants	6	956	6	1,286
6	Parish sales	1	160	.....	.....
7	Pre-emption sales	382	60,371	456	71,859
8	Purchased homesteads	56	8,586	71	10,741
9	Quit claim, sales	2	25	5	101
10	Quit claim, special grants	232	36,381	41	6,439
	Railways—				
11	Canadian Northern Railway Co	58	32,167	128	791,961
12	Canadian Northern Saskatchewan Railway Co	.....	.....	2	17
13	Canadian Northern Western Railway Co	1	6	.....	.....
14	Canadian Pacific Railway grants	10	2,188	1	14
15	Canadian Pacific Railway roadbed and station grounds	1	24	1	10
16	Manitoba and Southeastern Railway Co	4	192	.....	.....
17	Manitoba and Northwestern Railway Co	.....	.....	1	3
18	Qu'Appelle Long Lake and Saskatchewan Railroad and Steamboat Co	2	390	.....	.....
19	Sales	75	2,619	87	3,989
20	School lands sales	125	19,701	188	34,513
21	Soldier grants	138	21,365	72	11,310
22	Special grants	316	47,200	120	13,217
	Totals	2,473	398,759	3,053	1,237,718

STATEMENT D.—Letters patent issued, Dominion Lands in Alberta

No.	Nature of grant	From April 1, 1923, to March 31, 1924		From April 1, 1922, to March 31, 1923	
		Patents	Acres	Patents	Acres
1	Coal lands sales			1	288
2	Coal surface sales			1	40
3	Drainage sales	3	478		
4	Homesteads	1,123	174,768	1,774	277,178
5	Hudson's Bay Co	2	61	1	147
6	License of occupation	3	18	47	3,341
7	Military homesteads	1	320		
8	Mineral rights (50 acres)	1		1	
9	Northwest half-breed grants	9	1,445	1	80
10	Parish sales			1	45
11	Petroleum and Natural Gas, surface sales			1	7
12	Pre-emption sales	98	15,445	104	16,301
13	Purchased homesteads	14	2,089	22	3,203
14	Quit claim, sales	1	45	3	165
15	Quit claim, special grants	4	148	1	160
16	Quit claim, drainage sales	1	76		
	Railways—				
17	Alberta and Great Waterways Railway Co.	37	487	68	1,117
18	Calgary and Edmonton Railway Co	1	321	2	317
19	Canadian Northern Railway Co	3	131	2	30
20	Canadian Northern Alberta Railway Co.	1	3		
21	Canadian Northern Western Railway Co.	8	28	22	302
22	Canadian Pacific Railway grants	6	312	17	1,580
23	Central Canada Railway Co			4	26
24	Edmonton Dunvegan and British Columbia Railway Co	1	5	2	26
25	Grand Trunk Pacific Railway Co	6	38	1	12
26	Grand Trunk Pacific Branch Lines Co			6	68
27	Sales	94	2,839	112	6,739
28	School lands sales	66	5,593	89	9,697
29	Soldier grants	106	16,468	50	7,644
30	Special grants	252	36,391	68	7,779
	Totals	1,841	257,809	2,401	336,292

STATEMENT E.—Letters patent issued, Dominion Lands in British Columbia

No.	Nature of Grant	From April 1, 1923 to March 31, 1924		From April 1, 1922 to March 31, 1923	
		Patents	Acres	Patents	Acres
1	British Columbia homesteads	89	9,712	143	16,214
2	British Columbia sales	23	255	21	789
3	Homesteads, Peace River Block	42	6,433	73	11,386
4	Mineral rights (133 acres)	1			
5	Purchased homesteads	11	227	2	31
6	Railways—				
	Canadian Northern Pacific Railway Co			1	2
7	Canadian Pacific Railway grants	1	3	1	14
8	Canadian Pacific Railway roadbed and station grounds	10	151	7	73
9	Kettle Valley Railway Co			9	250
10	Nicola, Kamloops and Similkameen Railway Co	1	9	12	28
11	Sales, Peace River Block	3	43	1	14
12	Soldier grants	4	81	5	349
13	Soldier grants, Peace River Block	6	968		
14	Special grants	20	2,273	10	1,201
15	Special grants, Peace River Block	12	1,815		
	Totals	223	21,970	285	30,351

STATEMENTS F and G—Letters patent issued covering Dominion Lands

F—In the Yukon Territory

No.	Nature of Grant	From April 1, 1923 to March 31, 1924		From April 1, 1922 to March 31, 1923	
		Patents	Acres	Patents	Acres
1	Yukon Territory homesteads	2	316	1	160
2	Yukon Territory sales	11	333	7	192
	Totals	13	649	8	352

G—In the Northwest Territories

1	Mining lands sales	.....	.....	4	200
2	Sales	4	29	14	382
3	Special grants	.....	.....	8	456
	Totals	4	29	26	1,038

STATEMENT H.—Number of Homestead Entries made during the fiscal year 1923-24, the Nationality of the Homesteaders and the Provinces in which the entries were made

Nationality	Province				
	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Canadians from—					
Ontario	49	243	144	17	453
Quebec	15	70	48	3	136
Nova Scotia	7	14	18	4	43
New Brunswick	....	11	13	2	26
Prince Edward Island	....	8	4	2	14
Manitoba	158	118	23	5	304
Saskatchewan	2	121	21	2	146
Alberta	6	11	97	1	115
British Columbia		5	15	20	40
Persons who had previous entry	72	248	263	7	590
Newfoundlanders	1	2			3
Americans	48	300	271	20	639
English	63	173	143	36	415
Scotch	19	41	44	9	104
Irish	4	11	19		34
French	8	11	3	1	23
Belgians	2	5	2	....	9
Swiss	1	2	8	1	12
Carried forward	446	1,394	1,136	130	3,106

Nationality	Province				
	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brought forward	446	1,394	1,136	130	3,106
Italians	.....	3	.....	2	5
Roumanians	1	10	2	1	14
Germans	3	12	14	.....	29
Austro-Hungarians	117	94	84	8	303
Hollanders	2	5	7	1	15
Danes (other than Icelanders)	4	7	9	.....	20
Icelanders	3	4	....	1	8
Swedes	18	46	24	5	93
Norwegians	6	37	20	4	67
Russians other than Finns	14	44	22	6	86
Finns	7	5	10	4	26
Serbians	.....	....	2	1	3
Australians	....	....	1	....	1
New Zealanders	....	....	1	....	1
Greeks	2	.....	....	....	2
Poles	9	33	8	2	52
South Africans	.....	5	1	.....	6
Mexicans	.....	.....	6	.....	6
Totals	632	1,699	1,347	165	3,843

Number of souls represented by above entries, 8,804.

STATEMENT I.—Number of Homestead Entries made in the Provinces of Manitoba, Saskatchewan, Alberta, and British Columbia during the fiscal year 1923-24 by persons coming from the United States

State	Province					State	Province				
	Manitoba	Saskatchewan	Alberta	British Columbia	Total		Manitoba	Saskatchewan	Alberta	British Columbia	Total
Alabama			3		3	Brought forward	12	239	170	13	464
Arkansas			1		1						
California			1	1	2	Mississippi			2	1	3
Carolina, North		1			1	Missouri		5		1	6
Colorado		1	2		6	Montana		1	7		8
Columbia, District of					2	Nebraska		7	8		15
Connecticut	1	1	1	1	4	Nevada		6	1		7
Dakota, North	12	55	33	1	101	New Hampshire			1		1
Dakota, South	5	13	14		32	New York		6	4	1	11
Florida			1		1	Ohio		6	9		15
Georgia		1			1	Oklahoma		1	8		9
Idaho			2		3	Oregon		1	4	1	6
Illinois	2	14	17	2	35	Pennsylvania		1	9		10
Indiana		7	3		10	Rhode Island		2	1		3
Iowa	3	21	18	2	44	Tennessee	1		1		2
Kansas		5	10	1	16	Texas		3	4		7
Kentucky		1	5		6	Utah			3		3
Louisiana			1		1	Virginia	1		2		3
Maine		3	2		5	Virginia, West	1		1		2
Massachusetts		5	5	1	11	Washington		1	12	2	15
Michigan	4	11	11	2	28	Wisconsin	3	19	16	1	39
Minnesota	15	95	39	2	151	Wyoming			2		2
Carried forward	42	239	170	13	464	Totals	48	300	271	20	639

STATEMENT J.—Number of Homestead Entries made during the fiscal year as compared with the previous fiscal year

Agency	Manitoba		Saskatchewan		Alberta		British Columbia		Total
	1924	1923	1924	1923	1924	1923	1924	1923	
Battleford			159	386					
Calgary					148	143			
Dauphin	315	363							
Edmonton					942	1,586			
Grande Prairie					82	172	12		
Kamloops							77	58	
Lethbridge					21	20			
Moose Jaw			79	77					
New Westminster							72	50	
Peace River					133	286	9		
Prince Albert			1,308	1,219					
Revelstoke							16	45	
Saskatoon			139	361					
Swift Current			13	61					
Winnipeg	317	516							
Fiscal year 1922-1923									5,343
Fiscal year 1923-1924									3,843
Net increase									1,500
Totals	632	879	1,699	2,104	1,326	2,207	186	153	

STATEMENT K.—Number of Soldier Grant Entries made during the fiscal year as compared with the previous fiscal year

Agency	Manitoba		Saskatchewan		Alberta		British Columbia		Total
	1924	1923	1924	1923	1924	1923	1924	1923	
Battleford	.....	.....	25	45	.....	.....	.....	.....	
Calgary	.....	.....	.....	.....	34	28	.....	.....	
Dauphin	84	398	.....	.....	.....	.....	.....	.....	
Edmonton	.....	.....	.....	.....	96	184	.....	.....	
Grande Prairie	.....	.....	.....	.....	19	47	6	.....	
Kamloops	.....	.....	.....	.....	.....	.....	12	10	
Lethbridge	.....	.....	.....	.....	10	2	.....	.....	
Moose Jaw	.....	.....	107	8	.....	.....	.....	.....	
New Westminster	.....	.....	.....	.....	.....	.....	9	34	
Peace River	.....	.....	.....	.....	28	67	.....	.....	
Prince Albert	.....	.....	190	255	.....	.....	.....	.....	
Revelstoke	.....	.....	.....	.....	.....	.....	5	2	
Saskatoon	.....	.....	18	43	.....	.....	.....	.....	
Swift Current	.....	.....	9	19	.....	.....	.....	.....	
Winnipeg	58	70	.....	.....	.....	.....	.....	.....	
Fiscal year 1922–1923	.....	.....	.....	.....	.....	.....	.....	.....	1,212
Fiscal year 1923–1924	.....	.....	.....	.....	.....	.....	.....	.....	710
Net decrease	.....	.....	.....	.....	.....	.....	.....	.....	502
Totals	142	468	349	370	187	328	32	46	

REPORT OF THE CONTROLLER OF SCHOOL LANDS, W. T. ROLLINS

During the fiscal year ended March 31, 1924, no school lands were offered for sale by general public auction. A small number of parcels for public purposes were disposed of by sale at public auction and others by private sale. The details were as follows:—

MANITOBA

How disposed of	Area acres	Value	Average per acre
		$ cts.	$ cts.
Railway companies	22·20	321 38	14 48
Dried up areas	436·00	1,308 00	3 00
Total	458·20	1,629 38	3 56

SASKATCHEWAN

Public auction	335·77	3,755 79	11 19
Under Irrigation Act	1·87	13 09	7 00
Railway companies	0·58	11 60	20 00
School sites	18·10	215 40	11 90
Total	356·32	3,995 88	11 22

ALBERTA

Public auction	129·41	2,419 80	18 70
Railway companies	229·81	4,174 65	18 17
School sites	13·00	130 15	10 01
Dried up areas	49·80	249 00	5 00
Total	422·02	6,973 60	16 52

The following statement shows approximately the areas and values of School Lands and values of town lots disposed of down to March 31, 1924, after making deductions for cancelled sales and adjustments in regard to changes in area:—

Province	Area acres	Value	Average per acre	Value of town lots
		$ cts.	$ cts.	$ cts.
Manitoba	658,602·00	6,354,523 56	9 65	5,165 00
Saskatchewan	1,351,735·00	22,750,945 85	16 83	12,571 00
Alberta	877,044·00	12,108,072 50	13 81	39,680 00

The number of permits and leases issued, the number of leases in good standing, and the combined revenue derived therefrom for the provinces of Manitoba, Saskatchewan, and Alberta for the fiscal year were as follows:—

—	Permits issued	Leases issued	Leases in good standing	Revenue derived
				$ cts.
Grazing	5,759			102,498 72
Cultivation	589			46,550 30
Timber	203			17,260 77
Hay	2,478	4	23	6,541 67
Coal		16	98	29,159 70
Petroleum and gas		174	469	30,420 01
Special		12	28	1,126 48

During the fiscal year 265 assignments of sales and leases were registered comprising lands in the provinces of Manitoba, Saskatchewan, and Alberta. The registration fees amounted to $948.45.

REVENUE AND EXPENDITURE STATEMENTS

The total net revenue collected for the fiscal year was as follows:—

Manitoba	$ 64,392 97
Saskatchewan	924,365 11
Alberta	508,807 27
Total	$ 1,497,565 35

The revenues collected for the fiscal year, (less principal moneys and less expenditure) and paid over to the provinces of Manitoba, Saskatchewan and Alberta, were as follows:—

Province	Revenues other than principal moneys	Expenditures	Amount paid to Province
	$ cts.	$ cts.	$ cts.
Manitoba	26,263 09	14,894 69	11,368 40
Saskatchewan	405,490 60	45,957 84	359,532 76
Alberta	273,971 33	30,847 06	243,124 27

The balance standing to the credit of the School Lands Fund for each province as on the 31st March, 1924, and the interest paid on the investment for the fiscal year 1923-24 were as follows:—

Province	Total amount at credit of Fund	Amount invested in debenture stock	Interest paid on investments fiscal year 1923–24
	$ cts.	$ cts.	$ cts.
Manitoba	5,739,544 45	5,739,000 00	285,350 00
Saskatchewan	13,101,346 42	13,101,000 00	632,325 00
Alberta	6,881,180 52	6 881,000 00	333,250 00

Statements herewith lettered A, B and C, respectively, show the revenue collected from each of the provinces of Manitoba, Saskatchewan, and Alberta for the fiscal year, duly classified.

Statements herewith lettered D, E and F, respectively, show the balance standing to the credit of the School Lands Fund for each province as on March 31, 1924, after deducting amounts invested in Debenture Stock as provided for by Order in Council.

STATEMENT A.—Manitoba School Lands—Revenue collected for fiscal year

Source	Gross totals		Refunds	Net totals
	$ cts.	$ cts.	$ cts.	$ cts.
Sales, Principal		38,342 28	212 40	38,129 88
" Interest		13,833 08	307 21	13,525 87
Cultivation		1,421 89	45 00	1,376 89
Grazing rent		3,781 15	87 49	3,693 66
Timber	5,290 04			
Less office fees transferred to Dominion Lands	63 00	5,227 04	36 75	5,190 29
Hay	2,858 59			
Less office fees transferred to Dominion Lands	693 00	2,165 59	234 95	1,930 64
Petroleum and natural gas		331 74		331 74
Registration fees	4 00			
Transferred from Dominion Lands	61 00	65 00		65 00
Miscellaneous		154 00	5 00	149 00
Totals		65,321 77	928 80	64,392 97

STATEMENT B.—Saskatchewan School Lands—Revenue collected for fiscal year

Source	Gross totals		Refunds	Net totals
	$ cts.	$ cts.	$ cts.	$ cts.
Sales, Principal		520.363 38	1,488 87	518,874 51
" Interest		295,461 57	703 02	294.758 55
Cultivation		43,026 35	4,681 05	38,345 30
Grazing rent		58,451 36	496 13	57,955 23
Timber	1,751 62			
Less office fees transferred to Dominion Lands	72 00	1,679 62	45 75	1,633 87
Hay	4,137 70			
Less office fees transferred to Dominion Lands	1,145 00	2,992 70	87 55	2,905 15
Coal		4,777 71		4,777 71
Petroleum and natural gas		2,839 77		2,839 77
Registration fees				
Transferred from Dominion Lands		324 65		324 65
Miscellaneous		1,975 37	25 00	1.950 37
Totals		931,892 48	7,527 37	924,365 11

STATEMENT C.—Alberta School Lands—Revenue collected for fiscal year

Source	Gross totals		Refunds	Net totals
	$ cts.	$ cts.	$ cts.	$ cts.
Sales, Principal		234,894 25	58 31	234,835 94
" Interest		161,963 86	260 70	161,703 16
Cultivation		7,544 11	716 00	6,828 11
Grazing rent		41,842 02	992 19	40,849 83
Timber	10,781 41			
Less office fees transferred to Dominion Lands	68 00	10,713 41	276 80	10,436 61
Hay	2,450 90			
Les office fees transferred to Dominion Lands	640 00	1,810 90	105 02	1,705 88
Coal		26,967 08	2,585 09	24,381 99
Petroleum and natural gas		27,746 96	498 46	27,248 50
Registration fees	81 50			
Transferred from Dominion Lands	481 30	562 80	4 00	558 80
Miscellaneous		258 45		258 45
Totals		514,303 84	5,496 57	508,807 27

STATEMENT D.—Revenue and Expenditure, Manitoba School Lands, 1923-1924

Particulars	Dr.	Cr.
	$ cts.	$ cts.
By balance on April 1, 1923		414 57
" sales		51,655 75
" cultivation permits		1,376 89
" timber dues, hay permits, grazing rental, petroleum and miscellaneous		11,295 33
" registration fees		65 00
" interest on fund		608 96
To cost of management at Ottawa	9,469 19	
" outside salaries, printing, advertising and general expenses	5,425 50	
" revenue and interest paid to Manitoba Government	11,368 40	
" interest on fund paid to Manitoba Government	608 96	
" investment in 5 per cent debenture stock	38,000 00	
" balance, March 31, 1924	544 45	
	65,416 50	65,416 50

STATEMENT E.—Revenue and Expenditure, Saskatchewan School Lands, 1923-1924

Particulars	Dr.	Cr.
	$ cts.	$ cts.
By balance on April 1, 1923		471 91
" sales		813,633 06
" cultivation permits		38,345 30
" timber dues, hay permits, grazing rental, coal, petroleum and miscellaneous		72,062 10
" registration fees		324 65
" interest on fund		11,253 75
To cost of management at Ottawa	28,407 58	
" outside salaries, printing, advertising and general expenses	17,550 26	
" revenue and interest paid to Saskatchewan Government	359,532 76	
" interest on fund paid to Saskatchewan Government	11,253 75	
" investment in 5% debenture stock	519,000 00	
" balance, March 31, 1924	346 42	
	936,090 77	936,090 77

STATEMENT F.—Revenue and Expenditure, Alberta School Lands, 1923-1924

Particulars	Dr.	Cr.
	$ cts.	$ cts.
By balance on April 1, 1923		344 58
" sales		396,539 10
" cultivation permits		6,828 11
" timber dues, hay permits, grazing rental, coal, petroleum and miscellaneous		104,881 26
" registration fees		558 80
" interest on fund		6,442 46
To cost of management at Ottawa	18,938 39	
" outside salaries, printing, advertising and general expenses	11,908 67	
" revenue and interest paid to Alberta Government	243,124 27	
" interest on fund paid to Alberta Government	6,442 46	
" investment in 5% debenture stock	235,000 00	
" balance, March 31, 1924	180 52	
	515,594 31	515,594 31

REPORT OF THE SUPERINTENDENT, MINING LANDS BRANCH, H. H. ROWATT

The revenue of the Mining Lands Branch during the fiscal year 1923-24 amounted to $697,170.68, which was derived from fees, rentals and royalties collected for mining rights, the property of the Crown, disposed of under lease or other form of terminable grant.

Expenditures incurred in the actual development of petroleum and natural gas rights acquired under lease may, under the regulations, be accepted on account of rental, and under this provision rentals due the Crown and which should otherwise have been paid in cash, amounting to $343,729.21, were satisfied by such expenditures, and so reduced the revenue of the branch to that extent.

Statements lettered A and B, showing in different forms how the revenue is made up, will be found at the end of this report. The statement lettered A shows the total revenue, and the statement lettered B shows the revenue collected at each agency, including the Yukon Territory.

The revenue of the Yukon Territory for the fiscal year, derived from mining rights only, amounted to $68,153.36.

The report for the fiscal year from the Gold Commissioner of the Yukon Territory, dealing with mining in that territory, is submitted.

Petroleum and Natural Gas.—There are now in force under the regulations 6,377 petroleum and natural gas leases, embracing a total area of 1,221,302·31 acres, distributed as follows: In Manitoba, 132 leases, comprising 29,757·35 acres; in Saskatchewan, 82 leases, comprising 20,271·31 acres; in Alberta, 5,599 leases, comprising 1,064,098·31 acres; in British Columbia, 564 leases, comprising 107,175·35 acres; and in the Northwest Territories, 48 leases, comprising 40,332·18 acres, and 51 permits, comprising 97,148·06 acres. The total area under permit and lease in the Northwest Territories is 137,480·24 acres.

The total revenue derived from petroleum lands during the year amounts to $176,155.68.

The total number of leases which have been issued under the provisions of the Petroleum and Natural Gas Regulations is 27,697, and the total revenue derived from this source since the beginning is $3,899,078.45. The total expenditure applied in lieu of rental during the same period was $1,653,943.96.

Natural gas in large quantity in widely different fields has been discovered, and its use for domestic and industrial purposes in different parts of the western provinces is increasing. The gas produced in the Turner Valley field of Alberta contains gasolene in commercial quantity, and an absorption plant for the recovery of such product has been installed and is in active operation, the gasolene content being extracted before the gas is piped to Calgary for domestic consumption.

In November, 1923, British Petroleums, Limited, completed an oil well in the vicinity of Wainwright, and at a depth of 2,035 feet obtained a production computed at 100 barrels a day. This company, as well as other lessees in the same district, proposes to conduct during the year intensive prospecting operations in the same locality with a view to further discovery.

By an Order in Council dated August 25, 1923, the Carbon-Black Regulations were established. Under these regulations a lessee of natural gas rights may be permitted to utilize gas discovered on his leasehold for the manufacture of carbon black, provided the gas to be so utilized is obtained in an isolated part of the country where there is no present or reasonably prospective market for the sale of the gas, and where it is not within reasonable piping distance of a centre of population. Such permit, however, is granted subject to the provision that if any community or company holding a franchise to supply natural gas to any centre of population, constructs a pipe line to the wells supplying the carbon-black plant, the volume of gas required to supply such centre of population through the pipe line shall at all times be available up to the capacity of the wells, the carbon-black plant to have the right to use the surplus gas only.

Coal.—The regulations for the sale of coal mining lands were withdrawn a number of years ago, and all sales made under the provisions of such regulations have now been completed. The total revenue collected from the sale of coal mining lands was $1,565,640.34.

Coal Leases.—The total number of coal mining leases in force at the close of the fiscal year was 689, comprising a total area of 214,729·36 acres, distributed as follows: In Alberta, 588 leases, comprising 204,357·11 acres; in Saskatchewan, 98 leases, comprising 5,394·25 acres; in British Columbia, 2 leases, comprising 4,938 acres; and in the Yukon Territory, 1 lease, comprising 40 acres.

The total number of coal mining leases issued during the year was 117, comprising 50,435·36 acres. The total revenue collected during the year for rental of coal mining rights was $188,895.26.

Royalty on Coal.—Under the regulations governing the issue of leases to mine coal, the royalty is fixed at five cents per ton of 2,000 pounds on the merchantable output of the mine.

The following is a statement showing the amount collected on account of royalty on coal mined from lands in the western provinces, the Northwest Territories, and the Yukon Territory, respectively, during each year since the regulations came into effect:—

Year	Alberta	Saskatchewan	British Columbia	Yukon	Northwest Territories
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1903-04	56 90	Nil	Nil	22 40	Nil
1904-05	2,822 00	110 70	"	47 00	"
1905-06	2,379 75	47 10	"	569 33	"
1906-07	3,865 26	74 20	"	517 34	"
1907-08	7,621 67	4 30	"	1,543 38	"
1908-09	5,322 39	358 11	"	371 73	"
1909-10	153,559 98	1,672 50	3 00	136 38	"
1910-11	218,932 88	2,184 74	3 50	125 00	"
1911-12	104,894 55	2,034 74	2 78	390 00	"
1912-13	142,997 79	3,145 72	6 95	1,069 11	"
1913-14	147,198 75	2,123 43	19 35	Nil	"
1914-15	104,489 77	1,880 06	4 90	"	"
1915-16	67,190 17	2,601 52	3 50	"	5 10
1916-17	149,447 82	2,228 08	8 92	"	Nil
1917-18	144,634 75	4,046 55	Nil	"	6 00
1918-19	175,687 66	3,193 05	"	"	Nil
1919-20	181,641 80	2,573 32	"	"	"
1920-21	190,545 80	2,703 41	"	"	"
1921-22	185,436 88	3,309 86	"	"	"
1922-23	171,723 83	3,035 18	"	"	"
1923-24	210,389 53	1,689 45	"	"	"

The total revenue derived from coal mining lands on account of rental, royalty, and application fees during the fiscal year amounted to $404,312.24.

Quartz and Placer Mining.—During the fiscal year 847 entries for quartz and 87 entries for placer mining claims were granted by the Mining Recorders in Manitoba, Saskatchewan, and Alberta, and by the Mining Recorder for the Northwest Territories. There are 324 quartz mining leases in good standing, covering 14,787 acres. The total revenue derived from these claims was $37,817.15.

In the Yukon Territory during the fiscal year 115 entries for placer mining claims, 93 relocations and 2,601 renewals were recorded. The revenue from these sources and from fees for registering documents in connection with mining properties was $26.731. During the same period 208 quartz mining claims were granted in the Yukon Territory, and 1,435 renewals issued, the revenue derived from which amounted to $10,713.33.

The rich silver-lead deposits of the Mayo-Keno district of the Yukon Territory are still being mined and the ore shipped, notwithstanding the remoteness of the region in which this deposit lies and the difficulties of transportation. During the winter months a large quantity of high-grade ore is mined, sorted and prepared for shipment to smelters situated on the Pacific coast. It is represented that the cost of the mining, transportation and treatment of the ore is about $100 per ton.

Further progress has been made in the development of mineral deposits in northern Manitoba.

Quarrying.—The number of leases now in force, issued under the provisions of the regulations, is 154, distributed as follows: In Manitoba, 58 leases, comprising 1,941.30 acres; in Saskatchewan, 23 leases, comprising 762.72 acres; in Alberta, 43 leases, comprising 3,097.85 acres, and in British Columbia, 30 leases, comprising 930.48 acres.

The total revenue collected during the fiscal year on account of quarrying and clay leases, including application fees, amounts to $6,948.70.

Alkali.—The Alkali Regulations apply to natural accumulations of soluble mineral salts, comprising for the most part sodium and magnesium sulphates found in a comparatively pure condition in certain of the sloughs and shallow lakes of southern Saskatchewan. Under the provisions of these regulations 16 leases have been granted, comprising a total area of 5,707 acres, and the revenue derived from these sources during the fiscal year amounted to $853.15.

Royalty on Gold Mined in the Yukon Territory.—The total amount collected up to March 31, 1924, for royalty on gold, the output of placer mining claims in the Yukon Territory, after deducting the exemption at one time allowed under the regulations, was $4,871,075.54, of which amount $28,409.23 was collected during the last fiscal year. For the purpose of estimating royalty the gold is valued at $15 an ounce, which is much below its real value.

Assuming that gold on which royalty has been paid has an average value of $20 per ounce, the value of gold produced from placer mining operations in the Yukon Territory up to the 31st of March last might be placed at $162,890,157.80.

Dredging.—Eight leases to dredge for minerals in the beds of rivers in the Yukon Territory are now in force, including a total river stretch of 34.43 miles. The total revenue derived from this source up to the 31st of March, 1924, amounted to $201,675.72, of which amount $144.30 was collected during the fiscal year just closed. These dredging leases comprise portions of the Yukon, Forty-mile and Klondike rivers.

For the purpose of gold recovery there are at present five dredges engaged in mining in the Yukon Territory, all of which are being operated by hydro-electric motive power. Two of these dredges are of large capacity, capable of excavating and treating 15,000 cubic yards of gravel per day.

Seven leases to dredge for minerals in the submerged beds of rivers in the provinces of Saskatchewan and Alberta are now in force, covering a total frontage of thirty-six miles. Of these leases six are in Alberta and include thirty miles, and one is in Saskatchewan, including six miles. The total revenue derived from this source up to March 31, 1924, amounts to $51,992.95, of which amount $805.48 was collected during the past fiscal year.

Hydraulic Mining.—The regulations for the disposal of hydraulic mining locations in the Yukon Territory were withdrawn by an Order in Council dated the 4th of February, 1904. The leases then in force were not affected by such withdrawal. There are still five hydraulic mining locations held under lease, comprising a total area of 15.03 square miles. Rentals, amounting to $163,-127.43, have been collected on account of such locations, and the amount paid on this account during the fiscal year was $1,890.

Water Rights.—There are now in force in the Yukon Territory 488 grants to divert water for mining purposes under the provisions of the Yukon Placer Mining Act, aggregating a total of 120,445 miners' inches.

Tar-Sands.—The total revenue derived from the disposal of tar-sand rights amounted to $40,179.53. There are four leases in force, comprising a total area of 5,566.5 acres in the province of Alberta. Research work is still being conducted for the discovery of the most efficient method for the commercial recovery of oil and other hydro-carbons from these sands. The revenue for the current year derived from this source amounted to $412.91.

83305—12—4½

REPORT OF THE GOLD COMMISSIONER, DAWSON, YUKON TERRITORY, REGARDING MINING

Placer Gold Mining.—The amount of placer gold mined during the year was in excess of the previous year, the export tax having been paid on 75,757·89 ounces as against 68,850·68 last year.

Yukon Gold Company.—This company operated one dredge on Creek Claims Nos. 32-A to 36 inclusive on Gold Run creek during a dredging season of 85 days from June 15 to September 21, handling 447,601 cubic yards of material.

Eight hydraulic mines were operated at the following points: Adams Hill, King Solomon, Oro Fino Hill, Trail Gulch, Lovett, Right Limit, American Gulch, Cheechaco and Gold Hill, and 1,320,360 cubic yards were handled.

The hydro-electric power plant of the company on the Twelve-mile river furnished adequate power for the dredging and other operations of the company requiring power. The daily averages of men employed during the mining season (April to October) were as follows: dredges and thawing, 35; hydraulic mines, 40; ditches, 27; otherwise employed, 26; total, 138.

Burrall & Baird, Limited.—This company operated dredges Canadian Nos. 2 and 4 in the Klondike valley on Hydraulic Mining Lease No. 18, and Dredging Lease No. 24. Dredge No. 2 operated near the lower end of Hydraulic Mining Lease No. 18 from the 14th of May to the 12th of December, dredging 2,137,881 cubic yards of material. Dredge No. 4 operated on the upper end of the leasehold near the mouth of Hunker creek from the 12th of May to the 1st of November, dredging 1,908,753 cubic yards of material. Prospecting was carried on in advance of these dredges by means of a Keystone drill and shaft sinking.

A portion of the gravels in the Klondike valley are frozen, and to demonstrate the feasibility of thawing these frozen gravels 150,000 cubic yards were thawed by the cold water process on the course laid out for Dredge No. 2. Much of the naturally thawed ground on Hydraulic Lease No. 18 has now been dredged and the future operations of this company in the Klondike valley will depend in large measure upon their being able to thaw in a large way and cheaply these frozen gravels.

The pumping plant near the mouth of Hunker creek, operated by this company (power furnished from the North Fork), operated throughout the season and furnished an adequate supply of water to the operations of M. H. Jones on Last Chance.

In addition to these field operations, a considerable force of men were employed in the electric repair shop, welding shop, warehouse, mess, and stables at the headquarters of the company at Bear creek. An average of 70 men was employed by this company throughout the season.

The New North West Corporation, Limited.—This company and its subsidiaries are the holders of 905 placer mining claims in the Indian River watershed. Two dredges were operated by the company. The North West No. 1 commenced the season on No. 11 Below Lower Discovery on Dominion and worked upstream 3,500 feet, was in operation from the 24th of May to the 30th of October, and dredged 608,177 cubic yards of material. Dredge North West No. 2 commenced the season on No. 242 Below Lower Discovery on Dominion and worked up to No. 236 Below Lower Discovery, was in operation from the 20th of May to the 7th of November, and dredged 688,614 cubic yards of material.

Fifty-seven per cent of the gravels dredged by No. 1 were frozen, and all of the gravels dredged by No. 2. Except in the early spring, when a certain amount of steam thawing was done, water was used exclusively for thawing. Prospecting in advance of these dredges was carried on by means of a Keystone drill and by shaft sinking.

This company operated the hydro-electric power plant at the North Fork of the Klondike river, and furnished an adequate supply of power for the operation of their own dredges, the dredges and machine shops of Burrall & Baird, Limited, the pumping plant at Hunker creek, and the Dawson Electric Light and Power Company, Limited (for lighting the city of Dawson). An average of 77 men was employed during the season.

Other Placer Operations.—Mr. Neville A. D. Armstrong continued his prospecting operations on Russell creek, a tributary of the MacMillan river. In general the individual operations were quite as extensive as those of 1923.

Lode Mining.—This class of mining has been largely confined to the silver-lead operations in the Mayo district. In addition to the Keno Hill, Limited, and the Yukon Treadwell Company, Limited, the two largest operating companies in the district, a considerable tonnage of high grade ore was mined by individuals and miners working on leases, and disposed of to one or the other of the large companies on the waterfront at Mayo. The fact that they are able to dispose of the ores mined in the district has greatly encouraged these individual efforts, and has materially assisted in the development of the camp.

The Keno Hill, Limited, has temporarily discontinued work on the original Keno Hill group, and is now confining its operations to the systematic development of the Sadie and Friendship groups adjoining the holdings of the Yukon Treadwell Company, Limited.

The most pretentious piece of development work being carried on in the district is the driving of a three thousand-foot tunnel for the Yukon Treadwell Company, Limited, to strike the vein on its property at the six hundred-foot level. If this tunnel strikes the ore at that level, as it is confidently expected it will, the plans of the company contemplate the immediate erection of a fifty-ton mill to treat the lower grade ores being developed. The tunnel in question will be completed before July 1, and the mill installed during the coming summer.

The discovery of high grade galena ore on the Right Fork of the Beaver river has resulted in some sixty claims being located in that district during the past few months. From all reports received the indications are very favourable, large quantities of supplies have already been freighted in over the snow, and genuine development work will be carried on there during the coming summer.

The development of the district taken as a whole during the past year has been highly satisfactory.

Coal.—The Five Fingers Coal Company operated its mine at Tantalus butte and shipped coal to Dawson. The supply, however, was not equal to the demand, but the management advise that an adequate supply will be available this year.

STATEMENT A.—Statement of receipts on account of coal and minerals in the western provinces and territories for the fiscal year

Petroleum	$ 176,155 68
Quartz rental	1,850 00
Quartz royalty	143 07
Coal mining fees	3,338 00
Coal royalty	212,078 98
Coal rental	188,895 26
Coal sales	8 26
Mining fees (quartz and placer)	73,468 41
Hydraulic leases (Yukon)	1,890 00
Dredging leases (western provinces)	805 48
Dredging leases (Yukon)	144 30
Gold export tax	28,409 23
Free certificates, export of gold	16 50
Stone quarrying	6,948 70
Registration and office fees	1,204 45
Gypsum	50 00
Alkali rental	852 00
Alkali royalty	1 15
Potash	161 00
Tar sands	412 91
Sand stone and gravel permits	20 80
Improvements	85 00
Information fees	231 50
Total	$ 697,170 68

STATEMENT B.—Statement showing the total amount of revenue from minerals collected at each agency in the western provinces and territories for the fiscal year.

Battleford	$ 946 89
Calgary	163,812 91
Dauphin	11,360 85
Edmonton	228,413 66
Grande Prairie	1,670 29
Kamloops	999 50
Lethbridge	139,726 18
Moose Jaw	8,918 16
New Westminster	15,923 86
The Pas (Manitoba)	17,953 38
The Pas (Saskatchewan)	3,040 06
Peace River	13,893 02
Prince Albert	408 16
Revelstoke	1 00
Saskatoon	1,007 96
Swift Current	4,144 20
Winnipeg	13,215 84
Fort Smith (N.W.T.)	3,581 40
Dawson (Gold Commissioner's office)	31,575 88
Dawson (Royalty Collector's office)	28,397 74
Mayo (Mining Recorder)	6,921 10
Whitehorse (Mining Recorder's office)	1,230 65
Whitehorse (Royalty Collector's office)	27 99
Total	$ 697,170 68

REPORT OF THE CONTROLLER, TIMBER AND GRAZING LANDS BRANCH, B. L. YORK

The revenue derived from timber, grazing and hay lands during the fiscal year ended March 31, 1924, amounted to $883,736.90. This is a decrease of $2,337.47 from revenue received during the previous fiscal year. Owing to the number of timber sales by public auction being much smaller in 1923-24 than in the preceding year the amount received in the form of cash bonus was reduced from $166,408.37 to $14,868.55. On the other hand the receipts from rentals, royalty, permit fees and dues, etc., were considerably greater than

from the same sources in 1922-23, so that the total received from timber was over $12,000 greater than in that year. The various items under grazing for the most part show decreases as compared with the preceding year, the total from this source being somewhat over $14,000 less than in 1922-23.

REVENUE FOR FISCAL YEAR 1923-24

Timber—		
Bonus under license	$ 14,868 55	
Rent under license	79,084 60	
Royalty dues under license	360,796 82	
Permit fees, dues and rentals	232,740 92	
Seizure dues	29,517 03	
License fees	1,209 37	
Scaling fees	10,980 51	
Scale books	39 75	
Total for timber		$ 729,237 55
Grazing, Hay, etc.—		
Grazing	$ 106,354 23	
Hay	13,820 85	
Registration fees	460 55	
Fireguarding fees	29,997 02	
Improvements	3,846 70	
Sundries	10 00	
Total for grazing, etc		$ 154,489 35
Total revenue		$ 883,726 90

The following statements show the total revenue from the Crown timber agencies, the number of berths operated, the quantities of timber manufactured, the area of lands held under license and permit, and the number of grazing leases and the area thereof:—

The revenue from timber, grazing and hay lands received at the Crown timber agencies, and the number of berths operated under license and permit were as follows:—

Agency	Total Revenue	Number of berths operating under license	Number of berths operating under permit
Calgary	$ 49,891 97	13	13
Edmonton	146,663 55	33	125
Prince Albert	97,959 19	36	61
Winnipeg	94,239 29	20	41
Kamloops	89,084 40	25	11
New Westminster	276,445 96	58	.....

TIMBER

The returns of operations show the quantities of lumber and other material manufactured and marketed under license and permit to be as follows:—

Material	Under License		Under Permit	
	Manufactured	Sold	Manufactured	Sold
Lumber, ft. b.m.	300,321,840	292,181,613	21,083,740	20,022,015
Laths	23,098,068	25,843,407	107,000	108,600
Railway ties	474,519	549,203	280,080	262,836
Piling (linear feet)	128,210	124,260	37,079	16,829
Mining timber (linear feet)	1,171,406	1,171,406	675,732	489,185
Telegraph poles (linear feet)	1,139,874	1,070,504	295,575	242,115
Logs used in buildings (linear feet)	62,193	62,193	8,338	6,686
Fence posts	135,729	132,984	48,297	48,297
Shingle bolts (cords)	58,768	59,292	57	57
Shingles			1,075,000	671,750
Cordwood	24,398	24,232		
Slabs (cords)	3,806	3,831		
Pulpwood (cords)	302	302	530	312
Lath bolts (cords)			640	656
Cordwood and lagging			8,743	7,303

The area of lands held under license and under permit in the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia are as follows:—

Province	Square miles under license	Square miles under permit
Manitoba	1,064·92	1,155·82
Saskatchewan	912·76	143·00
Alberta	1,748·12	536·52
British Columbia	1,663·98	21·22
	5,389·78	1,676·56

During the year there were 241 berths granted as follows: 7 license berths; 35 portable sawmill berths; 86 cordwood berths; 100 firekilled berths; 13 permit berths.

GRAZING

The number of grazing leases in force during the year was 7,532 containing an area of 6,329,035 acres, made up as follows: Manitoba, 95,371 acres; Saskatchewan, 3,012,037 acres; Alberta, 2,870,957 acres; British Columbia, 350,670 acres.

During the year there were 1,098 new leases issued.

REPORT OF THE SUPERINTENDENT, ORDNANCE, ADMIRALTY, AND RAILWAY LANDS BRANCH, JOS. P. DUNNE

Within the period covered by this report the duties pertaining to Ordnance and Admiralty Lands under the control of this branch have considerably increased; this increase of work is due principally to the prosecution of the surveys carried on and the investigations necessary in connection with the administration of these lands; likewise, in securing detailed information concerning lands recently transferred from other departments to the control and management of the Department of the Interior, as provided by Act of Parliament.

The surveys and investigations in connection with bringing the very old plans and records of the properties dealt with up to date to facilitate admin-

istration and disposal have been continued. Areas at Kingston were investigated and the necessary surveys made. At Sarnia, Ont., a block of land of which this department reassumed control was resurveyed, the obliterated exterior boundaries re-established and monuments placed to perpetuate the same. In addition, data were obtained concerning leases subject to renewal and squatter's improvements. Along the Rideau canal various parcels no longer required for the operation of the canal were surveyed in connection with utilizing the lands to best advantage. In all cases modern plans were prepared as essential in dealing intelligently with the properties, some of the most valuable of which are very irregular in shape and often complicated by obliterated or lost boundaries.

The activities of the Railway Lands Division of this branch briefly consisted of the following work:—

The granting of some 16,275.94 acres of land to certain railway companies on land subsidy account and for right-of-way purposes. An investigation was made into the matter of dried-off areas in lands adjoining lands patented to railway companies. In this connection approximately 54,171 acres of land were released from reservation and made available for disposition the details of which are given in statements D and E herewith. Work in connection with the granting of the under rights in approximately 1,000,000 acres of Canadian Northern Railway Company's subsidy lands has occupied a considerable portion of the time and attention of this division during the period covered by this report.

The recording, copying, filing, and publication when necessary of Orders in Council affecting the Department of the Interior was carried on as usual.

The following statements give the details in regard to the lots dealt with and cover the activities of the Railway Lands Division during the year.

STATEMENT A.—Localities where Ordnance Lands are situated on account of of which moneys have been received during the fiscal year.

Locality	Total $ c.
Amherstburg	1 14
Burritt's Rapids	30 60
Burlington Beach	128 00
Carillon	0 20
Chambly	25 00
Fredericton	50,000 00
Fort Cumberland	162 00
Fort Erie	2 00
First Rapids	7 60
Gloucester	622 94
Grand Falls	147 18
Kingston	203 50
Long Island	2 00
Levis	1 00
Marlborough	4 00
Nepean	66 50
New Brunswick	5 00
Niagara Falls	1 00
Old Sly's Rapids	4 00
Ottawa	1,205 89
Owen Sound	81 10
Port Maitland	388 05
Prescott	31 00
Point Edward	244 52
Quebec	3,895 50
Queenston	1 00
Shelburne	4 00
Sorel	129 00
Storrington	1 00
St. Joseph's Island	6 50
Wolford	101 75
Total	$ 57,505 97

STATEMENT B.—Receipts for the fiscal year, classified

Rent	$ 4,315 14
Principal	52,799 18
Fees, interest, etc	391 65
Total	$ 57,505,97

STATEMENT C.—Amounts due and unpaid on account of purchase money and rent or interest for fiscal year.

Rent	$ 818 74
Principal	19,345 56
Interest	3,897 27
Total	$ 24,061 57

STATEMENT D.—Number of acres patented to the various railway companies during the fiscal year ended March 31, 1924

	Acres
Alberta and Great Waterways Railway	385·68
Canadian Northern Railway	14,450·75
Canadian Pacific Railway	580·70
Edmonton, Dunvegan and British Columbia Railway	5·29
Grand Trunk Pacific Railway	18·82
Manitoba and North Western Railway	252·40
Manitoba and South Eastern Railway	192·30
Qu'Appelle, Long Lake, Sask., Railroad and Steamboat Company	390·00

STATEMENT E.—Number of acres of dried-off areas adjoining lands patented to certain railway companies released from reservation and made available for disposition during the fiscal year 1924.

		Acres
Dried-off area—		
Canadian Pacific Railway (Main Line)	Approximately.	40,274
Calgary and Edmonton Railway	"	237
Souris B anch, Canadian Pacific Railway	"	7,071
Souris Branch, Pipestone Extension, Canadian Pacific Railway	"	246
Alberta Railway and Coal Company	"	2,058
Great North West Central Railway	"	810
Saskatchewan and Western Railway	"	240
Manitoba and North Western Railway	"	636
Manitoba and South Western Col. Railway	"	2,056
		53,628
In addition to the above there were many other parcels less than 10 acres each. These smaller areas make an approximate area of		543
Total		54,171

REPORT OF THE FINANCIAL CONTROLLER, P. MARCHAND

STATEMENT of net revenue collected from various sources for the fiscal year 1923-24

A—Dominion Lands, including Yukon	$ 2,281,863 90
B—School Lands	1,497,565 35
C—Ordnance Lands	57,502 24
D—Registrar's Fees	509 40
E—Casual Revenue	28 131 87
F—Fines and Forfeitures	2,337 81
G—Seed Grain and Relief Repayments	268,851 21
	$ 4,136,761 78

STATEMENT H shows the revenue from Dominion Lands classified under subheads

STATEMENT I is a comparison between the revenue from Dominion Lands for the present fiscal year and that of the previous fiscal year

STATEMENT A.—Dominion Lands Revenue (Cash and Scrip) for the fiscal year 1923-24

Agencies	Agency Payments	Head Office Payments	Scrip	Total Revenue
	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Lands—				
Battleford	6,399,84	2,367 34	.....	8,767 18
Calgary	50,162 01	7,933 81	.....	58,095 82
Dauphin	5,899 94	990 95	.....	6,890 89
Edmonton	20,609 17	1,917 50	.....	22,526 67
Grande Prairie	3,245 49	21 00	.....	3,266 49
Kamloops	4,140 38	105 58	.....	4,245 96
Lethbridge	20,832 36	7,062 15	.....	27,894 51
Moose Jaw	185,919 41	31,678 69	.....	217,598 10
New Westminster	3,968 37	511 40	.....	4,479 77
Peace River	2,740 54	365 08	.....	3,105 62
Prince Albert	46,559 47	5,443 62	160 00	52,163 09
Revelstoke	811 06	.....	.....	811 06
Saskatoon	11,254 85	1,648 38	.....	12,903 23
Swift Current	35,330 21	4,895 64	.....	40,225 85
Winnipeg	7,629 68	1,917 39	.....	9,547 07
Miscellaneous	1,814 05	11,475 60	.....	13,289 65
	407,316 83	78,334 13	160 00	485,810 96
Crown Timber and Forestry—				
Battleford	5,526 84	811 26	.....	6,338 10
Calgary	55,952 88	8,585 89	.....	64,538 77
Calgary Irrigation Office	618 50	.....	.....	618 50
Dauphin	25,715 85	2,955 76	.....	28,671 61
Edmonton	160,847 27	9,451 55	.....	170,298 82
Grande Prairie	2,898 96	155 66	.....	3,054 62
Indian Head	3,983 31	.....	.....	3,983 31
Kamloops	62,658 25	2,771 39	.....	65,429 64
Lethbridge	39,843 07	13,707 30	.....	53,550 37
Moose Jaw	27,862 42	12,803 83	.....	40,666 25
New Westminster	266,813 72	9,612 16	.....	276,425 88
Peace River	5,405 19	509 65	.....	5,914 84
Prince Albert	127,823 05	20,925 15	.....	148,748 20
Revelstoke	23,827 64	278 40	.....	24,106 04
Saskatoon	2,583 54	279 14	.....	2,862 68
Swift Current	15,055 13	4,560 75	.....	19,615 88
Winnipeg	94,634 01	2,824 23	.....	97,458 24
	922,049 63	90,232 12	.....	1,012,281 75

STATEMENT A.—Dominion Lands Revenue (Cash and Scrip) for the fiscal year 1923-24—*Concluded*

Agencies	Agency Payments	Head Office Payments	Scrip	Total Revenue
	$ cts.	$ cts.	$ cts.	$ cts.
Mining—				
Battleford	829 00	117 89	.....	946 89
Calgary	125,110 64	39,003 27	.....	164,113 91
Dauphin	8,269 73	3,091 12	.....	11,360 85
Edmonton	179,291 06	49,123 21	.....	228,414 27
Grande Prairie	439 11	1,234 18	.....	1,673 29
Kamloops	898 25	101 25	.....	999 50
Lethbridge	95,910 27	43,815 91	.....	139,726 18
Moose Jaw	6,749 74	2,168 42	.....	8,918 16
New Westminster	15,239 16	1,310 63	.....	16,549 79
Peace River	6,727 13	7,165 89	.....	13,893 02
Prince Albert	301 16	107 00	.....	408 16
The Pas	21,443 64	.....	.....	21,443 64
Revelstoke	1 00	.....	.....	1 00
Saskatoon	243 86	764 10	.....	1,007 96
Swift Current	3,800 88	343 32	.....	4,144 20
Winnipeg	12,379 43	5,784 82	.....	18,164 25
	477,634 06	154,131 01	.....	631,765 07
Canadian National Parks—				
Antelope	.....	28 00	.....	28 00
Brereton Lakes	.....	20 00	.....	20 00
Buffalo	2,703 15	28,044 09	.....	30,747 24
Elk Island	74 50	.....	.....	74 50
Fort Anne	.....	35 00	.....	35 00
Fort Edward	.....	25 00	.....	25 00
Glacier	368 43	21 75	.....	390 18
Jasper	6,245 93	20 50	.....	6,266 43
Kootenay	3,802 20	30 00	.....	3,832 20
Point Pelee	.....	28 00	.....	28 00
Rocky Mountains	65,386 91	1,369 15	.....	66,756 06
Vidal's Point	.....	18 00	.....	18 00
Waterton Lakes	4,491 48	.....	.....	4,491 48
Yoho	2,070 33	307 00	.....	2,377 33
Miscellaneous	.....	74 00	.....	74 00
	85,142 93	30,020 49	.....	115,163 42
Northwest Territories—				
Fort Smith	7,417 54	14,610 61	.....	22,028 15
Yukon Territory—				
Dawson	80,063 20	1,525 43	.....	81,588 63
White Horse	5,209 04	.....	.....	5,209 04
	85,272 24	1,525 43	.....	86,797 67
Total revenue	1,984,833 23	368,853 79	160 00	2,353,847 02
Less refunds	.....	.....	.....	71,983 12
Net revenue	.....	.....	.....	2,281,863 90

STATEMENT B.—School Lands Revenue for the fiscal year 1923-24

Province	Gross Revenue	Refunds	Net Revenue
	$ cts.	$ cts.	$ cts.
Manitoba	65,321 77	928 80	64,392 97
Saskatchewan	931,892 48	7,527 37	924,365 11
Alberta	514,303 84	5,496 57	508,807 27
	1,511,518 09	13,952 74	1,497,565 35

SESSIONAL PAPER No. 12

STATEMENT C.—Ordnance Lands Revenue for the fiscal year 1923-24

Fiscal Year	Gross Revenue	Refunds	Net Revenue
	$ cts.	$ cts.	$ cts.
1923-24	57,505 97	3 73	57,502 24

STATEMENT D.—Registrar's Fees for the fiscal year 1923-24

Registration District	Gross Revenue	Land Assurance Fund	Net Revenue
	$ cts.	$ cts.	$ cts.
Northwest Territories	42 30	3 90	38 40
Yukon Territory	561 00	90 00	471 00
	603 30	93 90	509 40

STATEMENT E.—Casual Revenue for the fiscal year 1923-24

Fiscal Year	Gross Revenue	Refunds	Net Revenue
	$ cts.	$ cts.	$ cts.
1923-24	28,317 00	185 13	28,131 87

STATEMENT F.—Fines and Forfeitures for the fiscal year 1923-24

Authority for Imposition of Penalty	Gross Revenue	Refunds	Net Revenue
	$ cts.	$ cts.	$ cts.
Northwest Territories Act	115 00	30 00	85 00
Northwest Game Act	250 00	.....	250 00
Criminal Code of Canada	15 00	.....	15 00
Migratory Birds Convention Act	346 00	20 00	326 00
Dominion Parks Regulations	1,205 16	79 75	1,125 41
Forestry Regulations	536 40	.....	536 40
	2,467 56	129 75	2,337 81

STATEMENT G.—Net Repayments of Seed Grain and Relief Mortgages for the fiscal year 1923-24

Year	Gross Collections		Refunds		Net Repayments	
	Principal	Interest	Principal	Interest	Principal	Interest
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1876	143 46	423 61	.....	61 75	143 46	361 86
1886–7–8	280 60	587 98	.....	4 98	280 60	583 00
1890	279 65	506 36	.....	5 15	279 65	501 21
1894	278 18	411 67	.....	1 95	278 18	409 72
1895	643 13	840 56	.....	3 78	643 13	836 78
1896	475 27	728 97	.....	3 68	475 27	725 29
1900	36 99	45 50	.....	.....	36 99	45 50
1901	175 80	191 06	.....	.....	175 80	191 06
1905	188 80	157 95	.....	.....	188 80	157 95
1908	989 26	830 16	7 85	21 12	981 41	809 04
1909	79 30	48 60	.....	.....	79 30	48 60
1911	1,032 46	791 91	.....	37 02	1,032 46	754 89
1912	1,116 33	1,134 43	.....	6 59	1,116 33	1,127 84
1913	50 75	50 00	.....	.....	50 75	50 00
1914	517 21	285 40	22 45	.....	494 76	285 40
1915	126,654 13	63,958 69	1,621 25	1,810 53	125,032 88	62,148 16
1917	1,587 30	706 59	123 75	19 64	1,463 55	686 95
1918	5,383 87	1,864 67	376 86	140 49	5,007 01	1,724 18
1919	8,290 89	4,512 31	102 42	117 36	8,188 47	4,394 95
1920	5,384 93	2,664 35	.....	50 82	5,384 93	2,613 53
1921	1,100 89	343 29	.....	50 60	1,100 89	292 69
1922	1,208 40	219 69	.....	.....	1,208 40	219 69
Relief prior to 1915	281 91	272 46	.....	9 08	281 91	263 38
Relief advances 1920–1923	23,931 93	12,539 55	655 22	121 65	23,276 71	12,417 90
	180,111 44	94,115 76	2,909 80	2,466 19	177,201 64	91,649 57

STATEMENT H.—Cash Receipts on Account of Dominion Lands Revenue for the fiscal year 1923-24

Source of Revenue	Gross Receipts	Refunds	Net Revenue
	$ cts.	$ cts.	$ cts.
Homestead fees	38,640 00	180 00	38,460 00
Sale fees	30 00	.....	30 00
Improvements	31,930 25	18,749 83	13,180 42
Sales of land	404,952 00	3,772 47	401,179 53
Map sales, rentals, office fees and miscellaneous	42,381 36	10,240 70	32,140 66
Timber dues	847,772 60	22,396 83	825,375 77
Grazing leases and hay permits	158,803 30	4,729 02	154,074 28
Rent of water-power, irrigation fees and miscellaneous forestry permits	13,652 16	21 05	13,631 11
Coal, petroleum, mining fees, export tax on gold, etc	693,178 18	10,595 22	682,582 96
Liquor permits, traders and trappers licenses	7,183 75	21 00	7,162 75
Canadian National Parks	115,163 42	1,277 00	113,886 42
	2,353,687 02	71,983 12	2,281,703 90

SESSIONAL PAPER No. 12

STATEMENT I.—Gross Receipts (Cash and Scrip) on Account of Dominion Lands Revenue compared with the previous fiscal year

Particulars	1923–1924	1922–1923	Increase	Decrease	Net Decrease
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Land Agencies	485,810 96	517,983 82		32,172 86	
Crown Timber Agencies	1,012,281 75	1,004,217 97	8,063 78		
Mining Agencies	631,765 07	710,915 70		79,150 63	
Canadian National Parks	115,163 42	75,304 59	39,858 83		
Northwest Territories	22,028 15	26,799 50		4,771 35	
Yukon Territory	86,797 67	96,545 56		9,747 89	
	2,353,847 02	2,431,767 14	47,922 61	125,842 73	77,920 12

PART II

CANADIAN NATIONAL PARKS

REPORT OF THE COMMISSIONER, J. B. HARKIN

The past year saw a substantial increase in the traffic to the Canadian National parks, indicating that both Canadians themselves and people from other countries are coming more and more to realize the wonderful opportunities for healthful recreation and exceptional enjoyment they afford. The tourist figures for 1923-24 totalled 250,026, or nearly 60,000 more than recorded the previous year. The figures are:—

	1924
Rocky Mountains park	94,930
Jasper park	10,072
Yoho park	1,891
Glacier park	4,176
Revelstoke park (estimated)	3,500
Waterton Lakes park	16,695
Buffalo park	5,650
Elk Island park	7,812
Point Pelee park	49,300
St. Lawrence Island parks	45,000
Fort Anne park	11,000
Total	250,026

For the first time Jasper National park was able to offer extensive modern hotel accommodation and its immediate success as a tourist centre was one of the outstanding features of the year. The artistic and restful bungalow hotel, "Jasper Park Lodge," built by the Canadian National Railways, met with instant favour from the travelling public and was crowded to capacity practically throughout the season. The great success of its initial season has led the railway to undertake the construction of additional buildings which will nearly double the accommodation.

Banff and Lake Louise showed a combined advance of 15,000 visitors, due in part to the increase in motor travel resulting from the completion of the Banff-Windermere highway. The growing use of the St. Lawrence Island parks, Waterton Lakes and Point Pelee parks is considered a matter for congratulation in view of the democratic service these areas are rendering to Canadian people. Visitors to the last two are largely family parties travelling in their own motor cars who are thus enabled to enjoy healthful outing at slight expense.

The most important feature of the year's work was the completion of the Banff-Windermere highway, which was officially opened for traffic on June 30, 1923. The formal ceremonies took place at Kootenay Crossing, B.C., in the presence of distinguished representatives of the Dominion, Provincial and United States Governments, the Canadian Pacific Railway and other organizations. At nine o'clock in the morning cars left Banff and Windermere, arriving at the scene of the opening about noon. Hon. Dr. J. H. King, Federal Minister of Public Works, representing the Dominion Government, presided at the simple but impressive ceremony and at its conclusion the Hon. Dr. R. H.

Brett, Lieutenant-Governor of Alberta, and the Hon. Walter Nichol, Lieutenant-Governor of British Columbia, severed the ribbons barring the highway and the first motor way across the Central Rockies was declared open to the motorists of the world. Among those present were: Hon. J. H. King, M.D., Minister of Public Works; Hon. R. H. Brett, M.D., Lieutenant-Governor of Alberta; Hon. Walter Nichol, Lieutenant-Governor of British Columbia; Hon. Herbert Greenfield, Premier of Alberta; Hon. John Oliver, Premier of British Columbia; Hon. W. J. Bowser, Leader of the Opposition in the British Columbia Legislature; Harvey M. Toy, of San Francisco, representing the Governor of California; J. Ross Eakins, representing the United States National Parks Service and the Department of the Interior, Washington, U.S.A.; D. C. Coleman, Vice-President of the Canadian Pacific Railway; Don Doig, Manager of the Automobile Club of Southern California; A. O. Wheeler, Director of the Alpine Club of Canada; Jas. W. Davidson, President, Calgary Good Roads Association; R. Randolph Bruce, Invermere, B.C., one of the originators of the Banff-Windermere highway project. Writers and journalists were present from Canada, the United States and Europe. Most of the chief Canadian cities had newspaper men in attendance while special representatives secured an account of the proceedings for Boston, Pittsburg, New York, Chicago, Portland, Tacoma, Seattle, Minneapolis, Los Angeles, and San Francisco journals. In addition, syndicates and magazines obtained particulars of the occasion through special correspondents.

The wet season and the poor condition of some of the connecting roads militated against a large travel, but in spite of this fact over 8,000 cars went over the road.

Motor Travel.—The motor campsite at the junction of the Bow and Spray rivers at Banff was extended and completed and is now one of the most modern and best equipped in the West. It provides accommodation for the increasing number of motor tourists. The number of permits issued to camping parties there last year totalled 1,693, or more than three times that of the previous year.

The development of a townsite at lake Louise with tea rooms, stores, etc., has also met the need of many motorists and numbers availed themselves last year of the opportunity of staying over at this beautiful resort.

Mount Revelstoke park was brought within reach of the outside motoring world by the opening up of the motor highway from the Okanagan valley to Revelstoke.

TIMBER PROTECTION

The fire patrol system was improved during the year in numerous details and no serious losses from fire occurred. The trail and forest telephone mileage was increased and a number of additional wardens' cabins were built. Forest fire warnings of a more permanent nature were established and automotive patrols added along the highways.

Fires in Canadian National Parks

Timber burned	3,313	acres
Grass burned	938	"
Cost of extinguishing	$4,705	
Number of fires	41	

The wardens' patrols totalled 225,102 miles. Sixty-five miles of new trails were laid in Jasper and Revelstoke parks and 36 miles of telephone line erected in Jasper and Waterton Lakes parks. The cost of wardens' cabins totalled $5,074; the cost of trail construction $15,050 and the cost of telephone installation $4,001.

Cars for use of the wardens in patrolling Kootenay park were purchased and a tractor and gang-plough were installed at Buffalo park for rapid ploughing of the fireguard areas. Fireguards were ploughed around the new area at Elk Island park. In preparation for aeroplane patrols several landing places were located and construction was begun in Rocky Mountains park and Kootenay park. An experiment in spring broadcast burning was made on Georgina island, one of the Thousand Islands of the St. Lawrence, with satisfactory results.

A working arrangement was made with the forestry officers of British Columbia by which a two-mile zone along the boundaries common to the parks and the province was placed under co-operative fire control. Ten new high-pressure portable pumps and a large capacity trailer pump for Kootenay and an automobile fire-truck for Banff were added to the equipment.

A conference of all the chief provincial and federal officers engaged in fire protection was called in Ottawa by the Minister of the Interior and the main problems on forest fire protection were discussed. The Canadian National Railways operating department also held a conference on the same topic at which many of the provincial and federal fire protection officers were present.

PUBLICITY

As the general public becomes more familiar with the attractions of the National parks, the demand for literature, information and general data relative to these reserves becomes heavier. Over 72,700 pamphlets were distributed during the year. So heavy was the demand that it was found necessary to authorize the publication of second editions of "Through the Heart of the Rockies and Selkirks" and "Guide to Banff and District," and a third edition of the "Banff-Windermere Highway." In addition the available supply of "The Nakimu Caves" and "Classified Guide to Fish and their Habitat in Rocky Mountains Park" has been completely exhausted, as well as the English editions of the Historic Sites pamphlets "Fort Chambly" and "Fort Ste. Marie II."

Through the itineraries carried out by the director of publicity, the official lecturer, and the motion picture operator, a total of 74,375 persons was reached. Lectures were delivered to 277 audiences and 753 films were shown. These educational lectures were given in Ontario, Quebec, Alberta, British Columbia and fourteen Middle West, Western, and Pacific States. The lectures in the United States were for the purpose of promoting tourist travel to Canada's National parks during the year. The opening of the Banff-Windermere highway entailed the promotion of an extensive publicity campaign, of which the lectures were an important part, and which was supplemented by the distribution of pamphlets and special articles. The results of this campaign were manifest in the success which attended the opening of the highway and the traffic that followed throughout the season.

A special publicity campaign was also carried on in connection with the sale of buffalo meat. As this is a new article of food it was necessary to interest the public in its merits before placing the meat on the market. Returns received show that the information supplied reached a wide field both in Canada and the United States.

Requests for material from several European publications were also dealt with, chief among these being illustrated articles on National parks, prepared for journals in Paris and Milan.

This work entailed a considerable amount of correspondence, 3,699 letters having been received in the division and 6,139 despatched in reply or direct association therewith.

83305—12—5½

ANIMAL LIFE AND FARMING OPERATIONS

All wild life in the various parks continues to thrive and multiply, responding favourably to the sanctuary afforded.

Buffalo.—A census of the buffalo herds taken on the 31st of March, 1924, resulted as follows: Buffalo park, 6,655; Elk Island park, 316; Rocky Mountains park, 21.

The size of the government buffalo herd has outgrown the grazing capacity of the park at Wainwright, in consequence of which some 2,000 of the surplus buffalo, mostly bulls, were slaughtered for commercial purposes during the fall and winter of 1923.

Numerous requests from Zoological Gardens throughout the world for the donation or loan of animals from the parks are still being received. In continuation of the spirit of co-operation previously shown in the conservation of wild life, and in view of the benefits derived by Canada from the advertising these donations receive, these requests are granted whenever possible. All expense incurred in connection with these transactions is borne by the consignees.

Farming Operations.—These operations mean a considerable annual saving to the department. In Buffalo park the total area of farms is 725 acres, of which 525 acres were under crop and 200 acres summer-fallowed. The crops harvested were 23,143 bushels of oats, 450 tons of straw, 1,000 tons of hay, and 137 tons of green feed. In Waterton Lakes park the total area farmed is 300 acres. The greater part of this area was sown to timothy and brome, and rye grasses. Thirty-five acres were sown to oats. It is of considerable advantage to this park to be able to provide its own forage owing to its distance from the railway, which makes the purchase of fodder practically prohibitive, on account of transportation charges.

Elk.—The 300 elk obtained from Yellowstone park some four years ago and placed in Jasper and Rocky Mountains Parks have progressed favourably and now number approximately 1,450. In addition to these there are approximately 350 within the fenced enclosure of Buffalo park and 220 in Elk Island park.

Antelope.—The preservation of animals outside the parks in danger of extermination, particularly the few remaining bands of antelope, has received careful study. The antelope in Nemiskam park are responding favourably to the protection afforded and now number 180, an increase of 40 over last year. An effort is being made to procure other areas as sanctuary for the few small scattered bands of these animals still existing in the provinces of Saskatchewan and Alberta.

Census.—An approximate census of all wild life within the confines of the parks and all fenced enclosures is now being made.

Cross-breeding.—During the year the specific results of new experiments in the cross-breeding of domestic cattle and yak, carried on at Buffalo park in co-operation with the Department of Agriculture, have resulted in the birth of three heifer calves and one male. Some of the experiments which will be based upon these new arrivals will naturally not be completed for several years.

TOWN PLANNING

Building plans for a large number of new buildings have been prepared during the year and many new sites planned. In connection with this work visits were made in the summer to Jasper, Banff, Radium Hot Springs and

Waterton Lakes. Plans of private buildings in the various parks have been submitted to the architect of the town planning division as in previous years and in many cases necessary changes have been advised and frequently new plans made in order to bring parks buildings to a standard worthy of their exceptional environment. Plans were made for a new subdivision at Radium Hot Springs and for the layout of the station grounds at Jasper; for automobile camping grounds and a new subdivision at Waterton Lakes park; a subdivision for summer cottages at lake Edith, Jasper park, the proposed layout of the grounds at Fort Howe, St. John, N.B.; Banff avenue boulevard and automobile parking place at Banff; preliminary drawings of the proposed police quarters and entrance gateway at Waterton Lakes; fort Chambly layout for cemetery grounds and central memorial.

The publicity and educational work included numerous articles for the *Town Planning Journal* and other magazines and newspapers; the composition of a Choric Ode for the opening of the Banff-Windermere highway and correspondence with town planning promoters in many parts of the Dominion. Plans of Canadian town planning schemes were sent to the Empire exhibition at Wembley.

PROTECTION OF MIGRATORY BIRDS

In the summer of 1923 amendments were made to the regulations under the Migratory Birds Convention Act which brought into effect certain changes in open seasons and altered slightly the restrictions placed upon certain methods for capturing these birds. A special amendment to the regulations was prepared respecting damage to crops in the Prairie Provinces, allowing ducks causing damage to be shot. Relief to farmers suffering damage was afforded by this new regulation. Special amendments to the regulations were also prepared respecting the killing of great black-backed gulls, loons and mergansers under certain conditions in portions of the province of Quebec.

The permanent organization for the enforcement of the Act throughout Canada has been kept at approximately the same strength and, in addition to the enforcement of the Act, the staff has engaged through lectures, publicity, and in other ways in extending information concerning the value of birds and the need for their protection. In carrying on this work the staff has enjoyed the fullest co-operation with the provincial game departments. Except in provinces where the provincial law does not conform to the treaty the actual enforcement of bird protection measures has been left largely in the hands of the provincial authorities.

The Royal Canadian Mounted Police are now ex-officio officers operating under the Migratory Birds Convention Act, bringing the number of honorary game officers to a total of 1,602.

During the summer Mr. H. F. Lewis and four assistants spent three months on the Canadian Labrador investigating bird conditions there and protecting breeding birds in this important waterfowl area. Special protection was given to the breeding birds at Bare island, off Sidney, in Haro strait, British Columbia, and Pilgrim islands, St. Lawrence river, about 100 miles below Quebec, during the breeding season, as well as to ducks at Buffalo lake, Saskatchewan. Special steps were taken to protect the whistling swan wherever flocks were found. Forty-eight offenders were prosecuted and fines were imposed amounting to $555. Four cases were dismissed, and one case withdrawn. It is the policy of the branch to refrain from taking action in the police court for trivial offences when a well directed talk will serve in bringing the offender to see the error of his ways, but it is regretted that many serious infractions are committed which leave the department no alternative but prosecution.

Educational.—Further editions of previous leaflets on bird protection were published. The total distribution of pamphlets of all kinds amounted to 112,304. Publicity concerning the shooting seasons and other bird protection matters was obtained through the distribution of 44,432 posters, 17,911 Acts and 7,890 abstracts of the regulations thereunder. Posters concerning the Migratory Birds Convention Act for Indians were translated into Cree and published in the *Cree Review.*

A new pamphlet, "Hints for Hunters," was prepared and printed. "Attracting Birds with Food and Water," a pamphlet on this subject, was published in both French and English. "No Spring Shooting" was reprinted, July, 1923, in *West Virginia Wild Life.*

Two hundred and fifty-eight lectures on bird protection were given by members of the permanent staff and lanterns slides and other material were furnished to honorary game officers and others for lecture purposes. In all 2,260 slides were loaned for lecture purposes. These slides are lent free of charge to responsible persons. Motion picture films of bird life were also distributed and proved an excellent publicity medium. The slide library of this division now comprises 679 views representing 196 different species of birds.

The Supervisor of Wild Life Protection attended different Boy Scout Camps during the summer and gave instructions and lectures on birds. He also acted as leader on several naturalists' excursions. Many articles in connection with bird protection were written by the supervisor, game officers and honorary game officers. School essay competitions were conducted throughout the western and Maritime Provinces. Copies of the late Dr. Hewitt's book "The Conservation of the Wild Life of Canada" were distributed to Boy Scouts and Girl Guides who passed tests for their naturalist's badge. Competitions in bird house building were organized by officers of the branch and other interested parties.

Arrangements were made so that flight officers of the Air Board may report upon bird life to this branch.

Every effort has been made to keep the public well informed regarding the game laws and game conditions as they change from time to time. Copies of game acts, posters and synopses of regulations under this Act were sent to a large number of sportsmen and others who are interested. The Government Radio Broadcasting Station co-operated with the branch in wild life protection publicity.

Bird Sanctuaries.—Six new bird sanctuaries were created by Order in Council during the past year, namely:—

1. Seal, Flat, Round, Mud and Noddy islands, situated in the province of Nova Scotia, lying approximately eighteen miles west of Cape Sable island.

2. Rideau island, situated within the city of Calgary, Alberta. The Boy Scouts of that city are interested in the welfare of the wild life on this reserve.

3. Vaseaux lake, B.C., and a certain specified area surrounding it.

4. The Gorge and Victoria Arm, Vancouver island, created a sanctuary by the Government of British Columbia and the Dominion Government.

5. Indian Head and Sutherland federal forest nursery stations, in the province of Saskatchewan.

Public Shooting Grounds.—An inspection was made of all the lands which were suggested by the province of Alberta, as being suitable for shooting ground purposes.

Permits and Licenses.—One hundred and seventy-three permits were issued allowing the holders to take birds for scientific purposes and seventy permits allowing the capture of birds for banding purposes. Through bird banding it

is hoped that much new and important information will be secured concerning Canada's valuable insectivorous and game birds. The branch is working in full co-operation with the United States Biological Survey in tracing and recording migration of birds in this way. Nearly all the work is done by voluntary co-operators. The official records for Canada of bird banding returns, which concern Canada, are kept in this branch. During the past fiscal year 5,804 records of banded birds were received, and 1,366 repeats and returns on banded birds came to hand. Sixty-nine taxidermists' licenses were issued during the past year.

Advisory Board on Wild Life Protection.—During the year this board held eight meetings and many important items were discussed.

Conference.—A conference of provincial and federal game officials was held in Ottawa on February 6, 7, and 8, 1924.

The conference was opened by an address of welcome, which was delivered by the Hon. Charles Stewart, Minister of the Interior. Mr. Stewart referred to the great need of protective measures to conserve the country's valuable wild life, including fur-bearing animals, game animals, and birds, and to the fact that the fur-bearing animals formed the chief means of support of Canadian Indians, lacking which the Indians would become a much heavier charge upon the Dominion. The trapping of fur as affording a very valuable revenue to the country was also noted.

The resolutions dealt with many important matters, such as: jurisdiction of provincial game officers; the amendment of the Customs and Export Act with respect to the export of game; a reconnaissance concerning species of birds other than those protected by the Migratory Birds Convention Act; the licensing and registration of trappers and hunters; the leasing of Crown lands; the adoption of measures for the suppression of the dumping of oil into navigable waters; and the shortening of the open season for woodcock.

Investigations on food habits of birds have been carried out by J. A. Munro, chief officer for Western Canada under the Migratory Birds Act.

HISTORIC AND PREHISTORIC SITES

Satisfactory progress was made during the past year in regard to the acquisition, preservation, restoration and marking of historic sites of national importance throughout Canada. To date over eight hundred sites, many of which are not considered of sufficient importance to receive attention, have been reviewed, from which one hundred and twenty-six have been selected for commemoration. The control of sixty- one of these has been acquired by transfer from other Departments, deed of gift or lease of occupation.

In connection with this work the policy adopted is to proceed for the present only with the actual work required to prevent deterioration of existing ruins, or the erection of memorials of an inexpensive nature. On sites where there are no historic remains to be restored or preserved, but historic occurrences need to be recorded, a memorial in the form of a cairn or boulder is erected to carry a standard bronze tablet. This tablet is of a highly artistic character. Into its frame phases of Canadian history have been symbolically and artistically worked, while the centre panel bears the inscription setting out the historic data connected with the site. Local societies and organizations are according their co-operation, and sentiment is growing strong in connection with this national work.

Sites Marked

The following twenty-one historic sites have been marked by the erection of memorials and in most instances the unveiling ceremonies have been carried out:—

Fort Cumberland, N.B., formerly old French Fort Beauséjour, erected in the middle of the seventeenth century, near Beaubassin, one of the most important Acadian settlements.

Fort Monckton, one and a half miles from Port Elgin, N.B., formerly old Fort Gaspereaux, erected in 1750 by the French at Bay Verte, to command the defence of the isthmus of Chignecto, and captured in 1755 by the British.

St. John, N.B., erected on a site provided by the city, to commemorate the landing of the United Empire Loyalists.

Fort Lawrence, three miles from Amherst, N.S., erected in 1750 at Misagouche by Major Charles Lawrence.

Shelburne, N.S., a large boulder and tablet erected on a site, provided by the town, commemorating it as the Loyalist town of Nova Scotia.

St. Maurice Forges, near Three Rivers, P.Q., on the St. Maurice river about seven miles from the city of Three Rivers, to commemorate the forges established there in 1730.

Three Rivers, P.Q., commemorating the military operations which took place there during the American invasion of 1776.

Laprairie, P.Q., erected on the site of the old fort built by de Catalogne in the fall of 1687, which afforded refuge for the settlers during a quarter of a century of wars 1687-1713.

Second Battle of Laprairie, "La Bataille," four miles from Laprairie, P.Q., commemorating the defeat of the forces under Major Peter Schuyler, August 11, 1691.

Kingston, Ont., tablet was placed on the walls of the building occupied by the Whig Publishing Company, which stands on the site of the old St. George's Anglican Church, where on July 8, 1792, Governor Simcoe held his first meeting of the Executive Council of the province of Upper Canada.

Glengarry House, four miles east of Cornwall, Ont., commemorating the services of Colonel the Honourable John Macdonell, who was a leading pioneer in the settlement and organization of the present province of Ontario.

Battle of the Windmill, near Prescott, Ont., commemorating the victory over an invading force of filibusters on November 13, 1838, during the Rebellion.

Battle of Chrysler's Farm, near Morrisburg, commemorating the victory over the invading Americans at the battle which took place there on November 11, 1813.

Fort Ste. Marie II, Christian island, near Penetanguishene, Ont., commemorating the Jesuit fort, Ste. Marie II, built in 1649-50 for the protection of the missionaries, and the remnants of the Huron nation, as a last stand against the Iroquois.

Mission of St. Ignace, near Midland, Ont., the most probable site of the martyrdom of the Jesuit missionaries, Fathers Breboeuf and Lalement.

Port Dover, Ont., "Cliff Site," an artificial stone cross, to commemorate the taking possession of the lands of the Lake Erie region in the name of King Louis XIV of France, by the Sulpician priests, Dollier and de Galinee on March 23, 1670.

Port Dover, Ont., "Wintering Site," commemorating the site of the wintering place of Dollier and de Galinee.

Battlefield of Chippawa, near Chippawa, Ont., tablet was erected on a monument provided by the Queen Victoria Niagara Falls Park Commission adjacent to their boulevard to commemorate the Battle of Chippawa or Street's Creek, July 5, 1814.

Battlefield of Frenchman's Creek, near Bridgeburg, Ont., tablet erected on a monument provided by the Queen Victoria Niagara Falls Park Commission to commemorate the action at Frenchman's Creek, November 28, 1812.

Battle of Cook's Mills, near Welland, Ont., commemorating the Battle of Cook's Mills, October 19, 1814.

Battlefield of Fort George, Niagara-on-the-Lake, Ont., commemorating the Battle of Fort George, May 27, 1813.

Battlefield of Beechwoods or Beaver Dams, near Thorold, Ont., commemorating the final phase of the Battle of Beechwoods, or Beaver Dams, June 24, 1813.

Sault Ste. Marie, Ont., commemorating the first Sault Ste. Marie canal, surveyed by the Northwest Company in 1797.

Arrangements for Acquisition of Other Sites

Arrangements have also been made for the acquisition of other historic properties, as well as various monuments and other structures of national interest. Action in this respect was taken at the following sites and various improvements made:—

Maritime Provinces.—Louisburg, Cape Breton; Battle of Grand Pré, near Grand Pré, N.S.; Champlain's "Habitation," Port Royal, N.S.; Fort Charnisay, St. John, N.B.; Martello Tower and Blockhouse, St. John, N.B.; Charlottetown, P.E.I.

Quebec.—Fort Chambly, Chambly; Fort Lennox, Ile-aux-Noix; Fort Crevier, Notre Dame de Pierreville; Battlefield of Lacolle; Madeleine de Verchères, Verchères; Fort St. Jean, St. Johns; Fort Ste. Thérèse, near St. Johns; Three Rivers Fort and Platon, Three Rivers; Fort Coteau du Lac, Coteau du Lac; Battlefield of Odelltown, Odelltown; Logan Memorial Park, Percé.

Ontario.—Glengarry Cairn, Monument Island, near South Lancaster; Fort Wellington, Prescott; Point au Baril, Maitland; Fort de Levis and Batteries, at Adams Point, near Cardinal; Fort Cataraqui or Frontenac, Kingston; Martello Shoal Tower, Kingston; Port Arthur; Port Dover; Point de Meuron, near Fort William; Welland Ship Canal, St. Catharines.

Western Canada.—Battlefield of Seven Oaks, Winnipeg, Man.; Fort Livingstone, Sask.; Nootka Sound, Friendly Cove, B.C.; Prince George, B.C.; Yale, B.C.; Prospect Point, Vancouver, B.C.

Work for Future

The following historic sites, which have been recommended for action by the Historic Sites and Monuments Board will be suitably marked in due course:—

Maritime Provinces.—Fort Edward, Windsor, N.S.; Fort Meductic, N.B.; Fort La Tour, St. John, N.B.; Campbellton, N.B.

Quebec.—Hochelaga, Montreal; Gaspé (Landing Place of Jacques Cartier); Fort Remy; Fort Sorel, Sorel; Fort Gentilly; Fort Cuillerier; Fort Rolland; Fort Verdun; Fort Senneville; Battlefield of Chateauguay, Chateau-

guay; Fort Longueuil, Fort Charlesbourg Royal; Cap Rouge; Arbre-à-la-Croix; Cap Madeleine; Tadoussac; Lachine Massacre, Lachine; Lachenaie near Terrebonne; Rivière des Prairies; Coulée Groulx; Battlefield of Cèdres above Montreal.

Ontario.—Ernestown Shipyard, near Bath; Southwold Earthworks, near St. Thomas; Mission of Ste. Marie I, near Midland; Vrooman's Battery, near Queenstown; Site of Tête du Pont Battery, near Chippawa; Weishuhn's Redoubt, near Willoughby; Navy Island Shipyard; Fort William; Fort Nottawasaga, near Stayner; Port Stanley; Point Pelee; Fort Norfolk, Turkey Point; Sandwich; Glengarry Landing, near Edenvale.

Western Canada.—Frog Lake Massacre, Alberta; Fort Macleod, Alberta; Battlefield of Fish Creek, Sask.; Duck Lake Battlefield, Sask.; Batoche, Sask.; Cut Knife Battlefield, Sask.; Battleford, Sask.; Fort Langley, B.C.

NATIONAL PARKS

A brief summary of the tourist and other activities and of the improvement work carried on in the national parks is given below.

Rocky Mountains Park

Tourist Traffic.—A considerable increase in the tourist figures is a marked feature of the year's record. Against a total of 79,742 for 1922-23, the figures for 1923-24 amounted to 94,930. The following is a summarized statement:—

Banff Springs Hotel	17,876
Chateau Lake Louise	22,367
King Edward Hotel	3,998
Mount Royal Hotel	3,618
Hotel Bretton Hall	3,545
Homestead Hotel	2,153
Cascade Hotel	1,483
Brett Hospital	601
Hot Springs Hotel	259
Larch Valley Camp (Alpine Club)	132
Cottagers, week-end excursionists	4,000
1,693 camping permits, 4½ persons each	7,618
8,485 autos, 4 persons each, less campers, as stated	27,280
	94,930

1922–23 visitors—79,742.

The hotel registration numbered 54,617, as against 51,226 for the previous season, and of this total 12.309 were Canadians, 36.639 Americans, 3,837 British and other nationalities and 1,832 conducted parties.

Government Baths.—There was a successful season at the Cave and Basin bathhouse. One thousand two hundred and forty-eight bathers were admitted to the baths on July 2, the largest number on record for any single day. The total number of bathers amounted to 46,778. At the Upper Hot Springs the flow, which showed signs of diminishing last year, finally ceased on March 12 and remained dry until May 11, when it started again and soon reached normal strength. The total number of bathers at these baths was 17,949, a decrease as compared with last year, which is explained by the cessation of the flow during two months of the season.

Motor Traffic.—A large increase in motor traffic is recorded, doubtless owing to the opening of the Banff-Windermere highway, and the excellent conditions of most of the park roads. The total number of motor licenses issued

in Rocky Mountains and Kootenay parks was 6,263, representing an increase of 2,050 visiting cars over the preceding season. One thousand seven hundred and thirty-five (1,735) American and 6,587 Canadian cars conveyed 33,460 visitors into the park, an increase of 14,501 motor visitors over the previous year. A single day record was established at the Eastern Entrance on July 1, when 277 cars entered the park, while a week-end record was registered on September 1, 2 and 3 at the same entrance, 936 cars passing east and west through Kananaskis gateway. Thirty-seven different states were represented among the visiting American motor cars.

Power-house.—The most important engineering work of the year was the construction of a new power-house plant for Banff townsite, necessitated by the closing of the coal mines at Bankhead. Previously Bankhead Mines Company had operated the power plant from which the town of Banff secured power and light, but, with the notification by the company that the electric light supply would be discontinued, it became necessary to construct a Government plant to supply the needs of the town. The work was commenced in February, 1923, and the plant was put into operation during February, 1924. The works included steel pen-stock, tunnel through rock, steel penstock crossing the Cascade river, woodstave pipe and steel distributing pipes. Two units and generators with accessories were installed, a concrete power-house was built and provision made for a third unit. The steel surge tank erected near the power-house is 14 feet in diameter and 67 feet high. A transmission line was constructed from the power-house to Bankhead. The equipment of the Canadian Pacific Railway Company's distributing system in Banff was taken over and new street lights installed.

Government Townsite.—A total length of 315 feet of new sewer was laid at Banff. A fence was placed around the new Bow bridge approaches and steps installed to allow visitors to reach the lower levels, and considerable work was done on the road approaches to the bridge.

An extensive sanitary campaign was conducted during the year. Inspections were made of all dairy premises and in a number of cases cow barns were condemned and closed. The annual tuberculosis tests among cattle were taken and one animal, only, was slaughtered. At Canmore the electric lighting system was extended from the townsite to a point near the station.

Camping.—The new camping grounds at mount Rundle were laid out, streets cleared and graded and buildings erected. These include a caretaker's cottage, service buildings and nineteen shelters. The town electrical system was extended to the camp grounds and to the golf club, and water and sewerage systems were installed. The work was completed in good time for the tourist season. The popularity of the camp is shown by the fact that while permits in 1917-18 were only 73 the number issued during the past season amounted to 1,693.

Golf Course.—The golf course was patronized beyond all precedent. Round tickets issued numbered 5,286 and 332 tickets for more extended use were taken out. Seventeen holes were available for play. Systematic top dressing of the greens was carried out to keep them in good shape.

Mosquito Control.—Excellent work was again accomplished by Mr. Hearle, of the Entomological Branch of the Department of Agriculture, in the elimination of mosquitoes. Two thousand four hundred and ten (2,410) gallons of oil were spread and a considerable amount of permanent work was done, although the wet season added to the number of breeding places and considerably augmented difficulties.

Roads.—Three crews were maintained during the season on the roads throughout the park in addition to the sectionmen. Two of the gangs were scarifying and surfacing between Lake Louise and Banff, and one gang was engaged between Banff and the eastern boundary of the park. A total of nine and one-half miles of surfacing was done between Banff and Lake Louise and this road is now one of the best in the park. Six miles between Banff and the eastern boundary were also surfaced, which put the road into excellent shape.

Zoo.—One golden eagle and four bear cubs were added to the zoo, which maintained its reputation as one of the important attractions at Banff. The polar bear is particularly popular and appears to enjoy the attention he receives. Thousands of tourists visited the animal paddock, mainly to see the buffalo, which are a source of perpetual interest. Animals in the paddocks total: 21 buffalo, 20 elk, 1 cow moose, 7 yak, I Persian ewe, 10 angora goats, 9 Rocky Mountain sheep, 15 Rocky Mountain goats, 24 four-horned sheep.

Game.—The elk appear to be increasing with great rapidity and have now spread from the vicinity of Banff to outlying regions. Moose are becoming more plentiful, and large numbers are seen at the Spray lakes, up Brewster creek and at Bow lakes. Rocky Mountain sheep may be seen in large flocks along the eastern slopes of Sawback range. Rocky Mountain goats are also increasing, and in some cases are now occupying former sheep ranges. Deer may be seen wandering through the townsites at any time of the year, and visitors are greatly delighted at being able to approach and feed these beautiful creatures. Birds seem to be greatly on the increase. There were destroyed 35 coyotes, 13 lynx, 12 wolverine and one mountain lion as predatory animals.

Fires.—Seven small general fires were reported and of these four were caused by campers leaving their fires burning. The total cost of these fires was only $124 and of this amount $113 was expended in combating one fire at the foot of Stony Squaw mountain. There were also eight railway fires, but the cost of extinguishing these was nominal and no damage resulted.

Clearing of slash, brush and scrub along the roadside between the eastern boundary and lake Louise as a fire protective measure was carried out, and the debris was burned during the early spring.

The only new trail work was the construction of 12 miles from the Bow valley to Red Deer summit, a trail that will be very useful from the fire and game protective point of view as well as for the tourists.

Fishing.—A very successful fishing season in the lakes and streams was reported. Restocking was carried on as usual by the Government hatchery, which liberated the following fry and fingerlings:—

Salmon trout in lake Minnewanka	84,119
Atlantic salmon	102,333
Cutthroat trout in Spray lakes	168,311
In other streams and lakes in park	240,458

Sports.—The thirty-third annual celebration of Indian Day held in the park on July 25 and 26 was the most successful yet held. In addition to the usual races and contests the Indians themselves arranged pageants depicting life in the early forties, which they carried out with a dramatic seriousness and attention to detail that greatly delighted spectators.

The other chief sporting events, the annual regatta on Bow river, May 24, and the Winter Carnival, were both carried out with enthusiasm. The carnival is each year attracting a larger number of visitors, many of whom come from long distances. A thirty-mile dog race on a five-mile course was one of the most interesting features this season.

Kootenay Park

Development in this park has consisted chiefly in the opening up of camps and townsites along the Banff-Windermere highway. During the summer months of 1922 an area was set aside for a townsite in the vicinity of Marble canyon, and in the spring of 1923 the lots were thrown open to entry. A townsite was also laid out at Radium Hot Springs and a number of applications for lots was received. A large tea room and rest house were erected there by the Canadian Pacific Railway Company, which provided excellent accommodation for the tourists during the season, and a small hotel under private management was also built.

A new gateway entrance to the park, containing rest room for visitors and quarters for the local warden, constructed from plans by the town planning division, was erected just west of the Hot Springs, and presents a very pleasing appearance.

Radium Hot Springs Bathhouse, Sinclair Canyon.—A very successful season was reported at this bathhouse. The total number of bathers was 5,955.

Permits.—Three hundred and ninety-six camping permits and 1,716 transient auto licenses were issued.

Motor Traffic.—Of the total number of motor cars entering through the western gate 1,410 were Canadian and 683 were from the United States, carrying a total of 9,415 persons. Two thousand four hundred and forty-one cars left the park, passing out through the western gate.

Traffic on the Banff-Windermere highway continued intermittently until November 27, when a heavy snowfall rendered the road impassable. Up to this date it was in good condition.

Game.—Although game protection measures have been in operation only a comparatively short time in this park, wild life is noticeably increasing. Larger numbers of sheep are observed in the vicinity of Radium Hot Springs as well as moose, elk, and deer throughout the park, indicating once more the rapid and beneficial effects of sanctuary conditions.

In connection with forest fire and game protection, work was begun on the construction of a landing place for aeroplanes at Macleod meadows. The ground was grubbed and levelled and other work done in order that the site may be in condition for use next year.

Yoho Park

The usual clean-up in the townsite of Field was undertaken as soon as the frost was out of the ground. This involved resurfacing of roads, planting of new trees in the boulevard, and laying new sidewalks to the extent of 1,500 feet at a standard width of six feet. The Emerald Lake road was maintained in excellent condition throughout the season. Repairs were undertaken on Ottertail road and some minor repairs on the Hector grade.

The trails between Field and Emerald Lake chalet and the Twin falls were cleaned out and widened and new bridges were constructed over the Little Yoho river and at Twin falls. A new truss bridge over Kickinghorse river on the Yoho road was the most important piece of construction. It consists of two spans, one 91½ feet and the other 62½ feet long on rock-filled piers. This bridge will eventually be on the main motor highway from Banff to Field.

Game is increasing rapidly, especially moose, deer, goat, and bear. On the Ottertail flats moose can be seen at almost any time of the day and are becoming very tame. Beaver also are thriving.

To maintain the fishing 13,800 rainbow trout fry were placed in Emerald lake.

There were no forest fires of any consequence. One railway fire and one general fire were reported but the total amount spent for fire-fighting was only eight dollars. It is believed this gratifying condition is very largely due to the educational methods carried out in regard to fire prevention.

Glacier Park

The road from the station to the Glacier trail was put in good condition as soon as weather permitted and the Nakimu Caves and Rogers Pass roads opened up and repaired.

The trail work was chiefly devoted to the Great Glacier and Asulkan trails which are the two most frequented in the park. One bridge was replaced at the foot of Great Glacier. A number of washouts on both these trails gave a considerable amount of trouble and caused a larger expense than usual. Other trails received the necessary attention. Rustic boundary signs were erected at both ends of the park along the railway line.

At the Nakimu caves further exploration was undertaken and good progress was made in opening up these wonderful caverns. During the season 700 persons from many parts of the world visited the caves.

Four fires, one railway fire and the other three caused by lightning were reported but the damage was inconsiderable.

Revelstoke Park

The early spring permitted the beginning of repair work towards the end of April. The improvement of roadbeds, clearing of ditches and culverts proceeded to the extent of seven miles. Approximately one mile of new road was opened up and it is hoped to get this road through to the top during the coming season.

A small grant to the ski club to improve the landing hill permitted this work to be done and some 600 yards of material were used for this purpose.

Trails through the park received the usual spring repairs following the slides and washouts resulting from the heavy snowfall and large volumes of snow water coming down the mountain slopes. A new trail was cut out and graded from Clach-na-Coodin creek to the valley of Silver creek, a distance of approximately 10 miles. Later this trail was extended to the eastern boundary and will now permit the passage of fire-fighting machinery all along the slope of the mountain.

There were three forest fires started by lightning all at an elevation of more than 3,000 feet. One of the fires was at an elevation of 5,300 feet and 800 yards of hose had to be used in extinguishing it. The fourth fire required nearly a mile of hose. In all cases however the portable engine and other equipment justified itself and saved the park from serious damage.

The number of visitors to the park totalled 8,958. as against 3,500 for the previous year.

Jasper Park

Visitors.—From hotel registrations and a careful estimate of unregistered visitors it is concluded that the tourist figures for Jasper park reached the satisfactory total of 10,072.

New Buildings.—There was a considerable growth in the town during the year. The decision to make Jasper a permanent divisional point led the Canadian National Railways to build fifteen new bungalows of a very attractive character. In addition the local residents have been building attractive bungalows and the vacant lots near the centre of the town are being gradually filled up. Several new stores have been added on the front business street. The estimated cost of the new buildings is $132,120, as compared with $69,500 of the previous year.

Roads.—The principal new construction undertaken was the conversion of a portion of the abandoned railway grade from Jasper to Snaring into a motor highway. A new highway bridge was built over the Snaring river. The usual maintenance work was carried on over the existing roads of the park.

Cabins.—Two new warden's cabins were built on the Smoky river in the northwest part of the park. This area abounds in the larger game animals such as moose, caribou, mountain sheep, goat and grizzly bear and was in need of the protection which the warden service is now in a position to give.

Wild Life.—All the game animals in the park are rapidly increasing. Mule deer are found in almost all the valleys of the park and are particularly numerous in the Athabaska valley. Around Jasper they have grown very tame and can be seen in the neighbourhood of the townsite almost daily. Caribou appear to be increasing throughout the northern portion of the park especially in the Smoky River and Twin Tree Lake districts. Several have also been seen at Dominion prairie, 14 miles west of Jasper. Moose are becoming plentiful in the northern part of the park and on the west fork of the Macleod river and Grizzly creek. They are also beginning to come into the Maligne area from the south and have been seen at Maligne canyon and at the golf links. Fine specimens were also encountered lately on the Snake Indian river. The elk or wapiti are becoming numerous and quite tame. A herd of fifteen to thirty can be seen almost daily within a mile of Jasper on the sidehills along Cabin creek. There are also large herds on the Pyramid plains near Cottonwood creek and at Buffalo prairie. In the southern part of the park around Brazeau lake and Isaac creek there is a herd of about 100 which comes down to Maligne lake, crosses Evelyn pass and winters at Buffalo prairie. All calves seen are in excellent condition. The sidehills to the east of the Athabaska from Pocahontas to Athabaska falls show flocks of from ten to twenty mountain sheep almost daily and on Buffalo prairie in the spring were exceptionally numerous. They are also coming into the Jacques Creek and Swiftwater Creek districts and are increasing very rapidly south of Brazeau lake. Goat are also becoming numerous and are found on the shale banks on the Snake Indian river and on mount Kerkeslin, near Athabaska falls, in the Snaring valley and along the Colin range. Bear are also increasing, and around Jasper black and cinnamon bear can be seen almost daily. Grizzlies are found in the Snake Indian, Rocky, and Smoky River valleys. Marten, fisher and mink, and particularly beaver are also noticeably more numerous.

Trails.—The most important new trail extension was that opening up the northwest portion of the park. Heretofore very little has been known of this rather inaccessible area but the construction of a standard trail from Deer creek along the valley to the Snake Indian river will permit the penetration and patrol of this section more easily. Twenty-three miles of excellent standard trail were constructed as far as Cache camp. There are now 640 miles of trails in the park, 280 miles of which are of standard construction, 282 ordinary trails and seventy-eight old Indian trails.

After several reconnaissance parties had been out to find the best route for a trail to Tonquin valley it was eventually decided to locate it up the Meadow Creek valley, using the west side of the creek. The first five miles of this trail proved to be exceedingly difficult with very steep sidehill work, some rock work and large timber in places. The trail was eventually completed satisfactorily, and is in length a distance of 13 miles from Geikie to Amethyst lakes. This has opened up, within one day's trip from Jasper, a picturesque and wonderful piece of country that hitherto had been very difficult of access for the average visitor.

The first eight miles of a trail from Maligne lake to Poboktan valley was completed in 1922 and this summer work was continued following the upper Maligne River valley to the summit and then taking the Maligne Creek valley to Poboktan creek. The distance constructed this year was 16 miles.

A piece of trail three and a half miles long from Athabaska falls to Cabin No. 10, Whirlpool river, was also constructed by the trail gang after finishing to Poboktan valley. This trail will be used mainly for fire and game protection.

Connaught drive in Jasper townsite was extended and a considerable amount of work done in extending the boulevard system.

Golf Course.—The construction of a nine-hole golf course was commenced about a quarter of a mile southeast of Jasper Lodge and a small temporary course provided. A professional was on duty to serve the needs of players.

Fires.—There were eight railway fires covering $14\frac{3}{4}$ acres which were extinguished at a cost of $269. There were also two general fires, probably caused by smokers' carelessness. These covered 1,105 acres and cost $250 to extinguish.

Waterton Lakes Park

This park is advancing steadily in popular favour particularly as a resort for family parties, a large number of whom, as well as golfers and anglers, spend the summer at the lake. Its possibilities for trail riders are also great, as it offers excellent trails and a variety of trips that comprise a maximum of scenery in a minimum of distance.

Visitors.—More attention was given to the registration of tourists and although the figures are far from complete, owing to late arrivals after the close of the office, 12,521 persons were registered, of whom 11,813 were Canadians, 683 from the United States and 25 from Britain and other countries. To this may safely be added 25 per cent for visitors who were not registered, making a total of approximately 16,695.

Roads and Bridges.—The spring floods did great damage to roads and bridges and necessitated numerous repairs. On account of this heavy maintenance few new works were undertaken. Approximately one mile of the Cardston road was gravelled. A new survey of the townsite was commenced and all new streets and avenues were opened, graded and gravelled. Approximately all the surveyed lots had been applied for, hence the necessity for the new survey.

Trails.—New trail construction consists of three miles on the Mount Lineham trail, three miles Indian trail and two miles on the Twin Lakes trail. Several old trails were also repaired and brought up to standard.

Water Supply.—The need for a water supply to the townsite has been manifest for a number of years. During the fall sufficient pipe was purchased for the purpose and 500 feet laid from Cameron creek covering the most difficult part of the construction.

Buffalo Park

Stock.—The annual increase in buffalo for the year has been 1,823 and the total decrease, including those slaughtered, 1,948. The animals now in the park are as follows: Buffalo, 6,655; moose, 29; elk, 258; mule deer (estimated), 1,194; antelope, 4; cattalo, 14; yak, 21; domestic cattalo (cattalo experiment), 13; hybrid yak-domestic, 6; hybrid yak-buffalo, 1; total 8,195.

The total capacity of the park for the maintenance of buffalo is estimated at 5,000. The records show that from and including the 700 buffalo imported in 1907 up to March 31, 1924, there have been 9,394 buffalo in the park. The decrease of these from various causes has been 2,739, leaving a total of 6,655.

Visitors.—The majority of visitors to this park come by motor. The records show that 5,650 persons visited the park during the season. Since there are no camping sites, boating or fishing, it is manifest that a lively interest in the animals is the main stimulus in attracting visitors to the park.

Farming Operations.—Farming operations were confined to growing oats, except some minor experiments with sunflower and white clover. Approximately 525 acres were under crop. Eighty-five acres of the total oat crop were cut for green feed and from the remainder, 23,143 bushels of oats were threshed. Approximately 15,000 bushels of this stock will be shipped to other parks and still leave feed for Buffalo park and seed for the coming year. Two acres of light land were selected for the sunflower experiment, from which 20 tons of feed were cut and fed to the buffalo, which seemed to relish this kind of feed. The experiment in white clover was judged to be successful; 1,000 tons of first-class hay were cut and stacked.

Fire Protection.—The ploughing of 155 miles of fireguard along the main fence on the southeast and north boundaries was done by the park outfit, while the ploughing of fireguard along the west boundary was done by hired teams. There was only one fire in the park, which was started by a lighted cigarette. Fortunately it was extinguished without doing any damage.

Fences.—The repair work this year was exceptionally heavy. Approximately 90 miles of high fence and six miles of meadow fence were gone over and placed in safe condition.

New Buildings.—The largest item in the building programme was the completion of the slaughtering plant in winter quarters of which part was erected last year. The plant is equipped with steam heat and power, is lighted by electricity, has a complete drainage and sewerage system and an incinerator. A building to provide sleeping accommodation for the men employed in the slaughtering plant and an addition to the boarding house at this point were also constructed.

Animals.—The improved pasture conditions made a considerable difference in the appearance of the buffalo and the elk, and the mild weather was also in their favour. The quantity of feed, particularly hay, given the buffalo during the winter has been small in comparison with other years and the herd is in better condition. The demand for live buffalo for city parks is steadily increasing. Eleven have been sent to various Canadian parks, three to Auckland, New Zealand, and two to Louisville, Kentucky.

Marketing Buffalo.—In view of the large increase in the buffalo herd and the limited pasture, a large number of aged buffalo had to be slaughtered. These operations were carried out during the fall and early winter when the animals were in good flesh and the fur prime. The buffalo meat, for which there was a ready demand, was marketed through various packing houses in Canada. The total number slaughtered was 1,847 of which 94 per cent were males. This is about three times the number of the herd originally brought into the park.

Breeding Experiments.—The progress made this year in connection with buffalo-yak-domestic cross-breeding experiments carried on by the Department of Agriculture at this park is very encouraging. Calves from the buffalo-domestic, yak-domestic and yak-buffalo crosses were obtained.

Elk Island Park

The number of visitors to the park during the year totalled 7,812, which is an increase over the preceding year of more than 2,000. The most important work of the year was the fencing of Cooking Lake forest reserve, extending

the area from 16 to 51 square miles. The fence is of woven wire eight feet high, and incloses thirty-four sections of the reserve. The work included the ploughing of a fireguard 10 feet wide the entire length of the fence but this was not completed owing to the lateness of the season. The animals were admitted to the park on December 5 and are thriving on the new pasture. A warden's cabin and stable were erected at the extreme south end of the park.

Improvements were made to the picnic grounds, which have become a great boon to the public. A road was cut to Sandy beach, a distance of about two and one-half miles. About 400 tons of hay were stacked. The old fireguards received the usual ploughing and discing.

The animals are in excellent condition. There are now 320 buffalo, 223 elk, 101 moose and 158 deer (estimated) in the park. Sixteen coyotes were destroyed.

Point Pelee Park, Ontario

There was a remarkable increase in visitors to the park during the year. While the number for 1922-23 was estimated at 7,000 a careful estimate for the past year places the number at 49,000. These figures show that this most southerly of the parks is becoming better appreciated not only for its great beauty and mild climate but also as a bird paradise. It extends from the mainland in Essex county eight miles south into lake Erie. Nature has made an admirable wild life resort within the park comprising an area of 3,500 acres in lakes, flats, and ponds. During the year 12,000 automobiles were admitted to the park, which is an increase of at least 50 per cent on the previous year, and 300 campers' permits were issued. There was a marked increase of visitors from the United States.

In view of this rapid development of traffic the roads have required special and continuous attention. The trees and shrubberies of the park were also tended carefully and no violation of parks' regulations have been manifest.

Several raccoons have found habitation within the park and the black squirrels that were introduced early in the year are multiplying. The English ringnecked pheasants are very interesting to visitors as they frequent the roadsides and walks through the park. Quail have greatly increased as a result of the protection afforded and because they are fed in winter.

Since the creation of this park as a bird sanctuary cottontail rabbits increased in such numbers that they had become a nuisance as they destroyed the small fruit trees of neighbouring settlers. The drive of last winter destroyed large numbers and this year in two drives only thirteen rabbits were taken.

Open water wildfowl, such as scaup, redheads, and canvas backs were not so plentiful as in 1922. The shoal feeding ducks, mallards, blacks, and baldpates, were about the same as last year. Teal and wood ducks were less numerous.

The lowering of the water levels has resulted in a decrease in the plant life which forms the food of muskrats and in consequence these animals have not increased this season.

As usual thousands of birds visited the park during the spring and fall migrations. Swans, black and mallard ducks arrived about the 20th of March and Canada geese somewhat earlier. The lakes of the park were still covered with ice but the birds subsisted on gleanings from nearby cornfields. Owing to the mild winter, the waters of lake Erie remained open east of the point and hundreds of mergansers and coweens could be seen fishing for fry in these waters.

Fort Anne Park, Nova Scotia

Fort Anne park attracted about 11,000 visitors this year, 5,400 of whom entered their names in the register. These figures surpass all previous records. The notable events of the year were visits of Governor Channing Cox, of the State of Massachusetts, and his party, on July 21, and His Excellency the Governor General, Lord Byng of Vimy, Lady Byng and suite, on August 3. There have been some interesting additions to the museum and library during the year, including a curious document signed by and bearing the seal of the Duke of Marlborough as "Master General of the Ordnance" in the "First year of His Majesty's Reign" (i.e., Geo. I, 1714) appointing a "Mattross" (gunner's assistant) to serve in "His Majesty's Train of Artillery at Annapolis Royal."

St. Lawrence Island Parks, Ontario

The estimated number of visitors to the charming island National parks among the Thousand islands of the St. Lawrence river is 45,000, as against 42,000 for the previous year. These reservations provide inexpensive and wholesome holiday grounds for campers and picnickers in the southern part of the Dominion. The parks are provided with stoves, pavilions and other conveniences and are patronized by girl guides, boy scouts, school parties and similar organizations which require holiday facilities, including swimming and boating, at small expense.

Revenue

Statement of revenue collected within Canadian National parks for the fiscal year ending March 31, 1924, as compared with the previous year:—

Park	1923-24	1922-23	Net Increase	Net Decrease
	$66,756 06	$62,975 25	$3,780 81	
	6,266 43	5,708 80	557 63	
Rocky Mountains	30,747 24	130 00	30,617 24	
Jasper	28 00	572 80		544 80
Buffalo	390 18	405 32		15 14
Antelope	4,491 48	3,472 83	1,018 65	
Glacier	35 00	31 00	4 00	
Waterton Lakes	2,377 33	1,669 54	707 79	
Fort Anne	3,832 20	88 20	3,744 00	
Yoho	28 00	3 00	25 00	
Kootenay	20 00		20 00	
Point Pelee	74 50	98 50		24 00
Brereton Lakes	18 00	27 00		9 00
Elk Island	25 00		25 00	
Vidal's Point		55 20		55 20
Fort Edward	74 00	67 15		6 85
Moose Mountain				
Miscellaneous	$115,163 42	$ 75,304 59	$ 39,858 83	

The Alpine Club of Canada

THE BANFF CLUB HOUSE

(Report Prepared by the Secretary)

The club house season was a very quiet one. The first guests did not arrive until the latter part of June and while at times the building was well filled, the visits were of unusually short duration. It was stated in the town of Banff—not on Government authority—that out of fourteen week-ends during the summer eleven had been wet. The usual number of visitors came from the hotels to gather facts about the mountain country. Quite a number of interesting expeditions were made during the summer.

83305—12—6½

Dr. Hickson with Mr. A. Geoffrion spent some four weeks at the head of the North and West fork of the Saskatchewan river. Watchman's peak and mount Spring-Rice were ascended but mount Bryce was unclimbable owing to weather conditions. Later on mount Rhondda and mount Hector were climbed. Somewhat later in the season Dr. Hickson made a most interesting climb of Cathedral crags from Cataract valley. Mr. A. Carpe, accompanied by Mr. H. Palmer and Mr. W. D. Harris, visited the mountains south and east of Maligne lake and climbed mounts Brazeau, Henry Macleod, Valad, Unwin and Replica peak. The second and third named are called after the original discoverer of Maligne lake in 1877 and his guide. Mr. C. G. Wates and Dr. Bulyea made another most plucky attempt on the stubborn mount Geikie, but were defeated within 300 feet of the top. Drs. Thorington and Ladd with Conrad Kain made a long and interesting trip in the Columbia icefield region. They traversed mount Castleguard and made the first ascents of mounts Terrace and Collie. Mount Saskatchewan was also a first ascent. Mounts Columbia and Athabaska were also made. It will be seen how much good work was done. Messrs. Hall and de Villiers Schwab travelled in the Wood River country and made the first ascent of mount Clemenceau and other peaks. Miss C. Hinman again made a long trip in the mountains visiting mount Assiniboine, Kananaskis pass and lakes and by Whiteman pass and Cross river to the Kootenay. This they followed to its head and by Wolverine pass and Tumbling creek to Ottertail and McArthur passes and returned to lake Louise via lake O'Hara.

Our guests came from all over Canada and the United States, and also from Alsace, French once again. They were drawn from the following places:—

Canada—British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick. *United States*—California, Illinois, Massachusetts, Michigan, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Washington, Oregon. *France*—Strasbourg.

Larch Valley Camp

(Report Prepared by the Secretary)

The eighteenth annual camp of the club was held in Larch valley above Moraine lake, from July 6 to August 9. The situation was a fine one and the view from the ladies' quarters superb. Seldom has a camp been more easily reached. Many motored directly from the club house to Moraine lake, and there then remained only the fairly steep ascent to the valley.

In the way of weather it was the strangest camp on record. For the first few days the weather was perfect. Brilliant warm sunshine, so warm in fact there was dread that the little stream which wanders through the valley and formed the water supply of the camp might dry up entirely.

However, there came a speedy change. On the night of July 30 snow started to fall and by early morning there were from eight to ten inches on the ground. Two tents were borne down by the heavy weight and it was only by continually scraping the snow off that the big dining fly was preserved. The snow dispersed fairly quickly but did not as in other years result in bright sunny weather. In fact the weather remained inclement for the greater part of August, consequently members cut short their proposed stay and returned to the cities with a result far from beneficial to the finances of the club.

A subsidiary camp was placed on the shore of lake O'Hara, which served the purpose of the two-day trip and also as a base for the climb of mount Odaray.

Some of the climbing was good, but the fresh snow and stormy weather altogether precluded such climbs as mounts Hungabee and Deltaform. In an ordinary season much good work could be done from Larch valley.

The so-called No. 10, which most people look on as an outlier of mount Hungabee, was the only first ascent made. Eiffel peak was used for training purposes and most of the graduates qualified on mount Temple, with varying fortunes some having a lovely view, others being wrapped in an electric storm, others in snow flurries and so on. Ascents were made of mounts Pinnacle, Neptuak, the latter most enthusiastically appreciated by all who made the ascent, and of mount Odaray. It had been hoped to make at least one ascent of mount Fay and perhaps others of the Ten Peaks, but weather rendered such plans hopeless.

The familiar and always delightful two-day trip, via Wenkchemna and Opabin passes to lake O'Hara and back via Abbot pass, was undertaken several times. The new and really luxurious hut built by the Canadian Pacific Railway at the summit of Abbot pass was greatly appreciated. Mitre pass was only once crossed as the ice conditions rendered it highly dangerous for all but the most expert. Still, it was remarkable how happy and cheerful every one was. The camp fires were highly successful and good fellowship reigned. Professor Fay and Sir James Outram told of the experiences of the earlier days; Dr. Munro Thorington and Dr. Ladd told of their latest experiences in the district of the great Columbia icefield and the Minneapolis section, but recently organized, celebrated an elaborate christening with great fervour. For the first time on record every one was ready to go, in fact almost all had gone before the last day of the camp.

The Swiss guides kindly lent by the Canadian Pacific Railway hotel department were Christian Hasler and Walter Feuz. It was the first experience of the latter in our camps, though other members of his family are very old friends. Both rendered excellent service under somewhat trying conditions.

There were 132 placed under canvas; among them representatives of the Alpine Club, England, the American, French and Swiss Alpine Clubs, the Appalachian Mountain Club, the Sierra Club, the Mazamas, and the Royal Geographical Society. Those present were drawn from the following places:—

Canada—British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec. *United States*—California, Massachusetts, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania. *England*—London. *Switzerland*—Flims.

PART III

FORESTRY

REPORT OF THE ACTING DIRECTOR OF FORESTRY,

E. H. FINLAYSON

This report covers the work of the Forestry Branch for the fiscal year ended March 31, 1924.

The slight decrease in the revenue of the branch noted in my last (1923) report has proved, as anticipated, only temporary, and the revenue for the past fiscal year was the largest in the history of the branch, resuming the steady annual increase which it has shown for many years past. The depression in the live stock industry of the West was reflected to some extent in a diminution of revenue from that source, but the lessening of returns from this source is more than made up for by increases in every other item of the branch's income. Particularly is this true of the receipts from the disposal of timber.

In practically every respect the branch can report progress for the year. The forests under its control have suffered less from fire than for several years past. The work of forest research is increasing in scope and quantity and is becoming of greater interest each year. Investigation of forest statistics is being steadily pursued and the results are becoming more accurate and valuable. The co-operative tree planting on the prairies is well sustained and is entering new spheres of usefulness. The investigations of the Forest Products Laboratories in the industrial uses of wood are yearly becoming better known and more highly appreciated. In other divisions of the branch's work the same spirit of activity and expansion is noticeable.

FORESTRY CONFERENCES

During the year there were held two gatherings which bid fair to have a far-reaching effect on the status of forestry in Canada. The second British Empire Forestry Conference convened in Ottawa on July 25, 1923, and the sessions lasted until September 7, when the conference adjourned after its final session at Victoria, B.C. The greater portion of the time of the conference was devoted to actual investigations of forestry conditions in the various regions of the Dominion. Major General Lord Lovat, chairman of the Forestry Commission of Great Britain, presided. Delegates were present from Great Britain, the Irish Free State, India, Australia, South Africa, New Zealand, and many of the larger Crown colonies. The Dominion Forest Service, the various provincial forest services, and the forest industries were well represented. The forestry situation in Canada was considered in its chief phases, and the results of the deliberations were summed up in a series of resolutions which embody the recommendations of foresters of wide experience, and will be invaluable as a guide in formulating forest policy and procedure in treating Canada's forests.

As a sequel to the British Empire Forestry Conference, a conference on Forest Fire Protection was convoked in January, 1924, by the Minister of the

Interior, and was attended by the provincial ministers charged with forest administration, together with their chief forest officers. The forest fire problem in all parts of Canada was exhaustively discussed, and the conclusions were summarized in a series of resolutions designed to serve as a basis for future action.

FIRE PROTECTION

The fire season of 1923 was a decidedly more favourable one than that of 1922, the total number of fires falling below that reported since the season of 1919. Fires reported in Dominion lands were less than half those occurring during the preceding season. In British Columbia, after a series of bad seasons, the fire season was about normal, with only a very short period of high fire-hazard. In April and May, dry weather in Alberta caused a danger season, which was later relieved by prolonged wet weather, though in northern Alberta the danger continued and many fires occurred during the summer. In Saskatchewan a period of somewhat high fire risk occurred during April and May. In Manitoba the season was generally favourable, though danger periods occurred in the latter part of May in southern Manitoba, and in June and July in northern Manitoba.

The total number of fires reported was 1,258; number of large fires, 367 (29·2 per cent of the total); total area burned over, 439,361 acres; area covered with merchantable timber, 129,121 acres; area covered with young growth, 99,857 acres.

FIRES WITHIN FOREST RESERVES

Cause	1923		1922		1921	
	Number	Per cent of Total	Number	Per cent of Total	Number	Per cent of Total
Unknown	61	35	60	11	32	11
Campers and travellers	21	12	51	9	28	9
Settlers	43	24	28	5	10	3
Railways	30	17	388	66	193	65
Lightning	4	2	12	2	9	3
Lumbering	2	1				
Incendiary	8	4·5	34	6	23	8
Brush disposal other than by settlers	1	0·5	1		1	
Other known causes	7	4	8	1	4	1
Total	177	100	582	100	300	100

FIRES OUTSIDE FOREST RESERVES

Unknown	236	22	292	14	174	15
Campers and travellers	193	18	314	15	108	10
Settlers	298	28	705	35	329	29
Railways	203	19	486	24	370	33
Lightning	73	7	105	5	38	3
Lumbering	15	1	11		12	1
Incendiary	26	2	76	4	20	2
Brush disposal other than by settlers	12	1	32	2	37	3
Other known causes	25	2	30	1	46	4
Total	1,081	100	2,051	100	1,134	100

TOTAL OF ALL FIRES ON DOMINION LANDS

Unknown	297	24	372	13	206	14
Campers and travellers	244	17	365	14	136	10
Settlers	341	27	733	29	339	24
Railways	233	18	874	34	563	39
Lightning	77	6	117	4	47	3
Lumbering	17	1	11		12	1
Incendiary	34	3	110	4	43	3
Brush disposal other than by settlers	13	1	33	1	38	3
Other known causes	32	3	38	1	50	3
Total	1,278	100	2,633	100	1,434	100

AEROPLANES

Aeroplane patrols were continued in Alberta and Manitoba, and their work is highly commended by the officials in charge of these districts. The fact that aircraft can be used successfully in forest protection is now fully established. The only remaining step is to perfect organization and develop equipment which will ensure maximum efficiency at costs within the economic means of forest authorities. The Royal Canadian Air Force and the Dominion Forest Service are bending all their energies to this end. The necessary practical experience and working knowledge of essential factors involved in reducing costs are being obtained through the operations in Manitoba and Alberta. These operations to-day serve a double purpose. They provide patrols for areas otherwise impossible of protection, and at the same time serve as proving grounds in which organization and material can be developed suited to the needs of all forest-protective agencies.

IMPROVEMENTS

In Manitoba and Saskatchewan the favourable fire season enabled extensive programs of improvements to be carried on. In southern Alberta a very wet spring hindered improvement work, and later in the season much work had to be done in the repairing of flood damage. In northern Alberta, however, more new construction was carried on. In British Columbia comparatively little was done, owing to the fact that the work originally planned had been practically completed. The following is a summary of improvements:—

	Number		Miles
Cabins	15	Roads	29
Ranger Station Houses	3	Trails	182
Stables	16	Telephone lines	144
Other buildings	19	Fireguards (cleared)	62
Bridges	2	Fireguards (ploughed)	136
Lookout towers	9		

TIMBER OPERATIONS

The policy of the Forestry Branch in the disposal of timber is working out satisfactorily. The province of Saskatchewan reports the most active season so far in this regard, which was marked by the largest sale on record under authority of the Forestry Branch. Manitoba reports an increase in the number of permits for saw-timber and fuel-wood. Alberta, while reporting a diminished cut under timber sales, records an increase in the number of permits and in the quantity of timber removed. The policy of requiring the overmature, burned, and diseased timber to be taken first is being continued, with beneficial results to the forests. Experiments in regard to the cost of brush-disposal were carried on in each inspection district and a volume of useful data recorded. Studies in this most important subject must be continued before definite figures can be made public.

PLANTING AND SEEDING ON FOREST RESERVES

The experimental planting and seeding was this year extended. This work is being done with a view to determining the best methods of artificially restocking certain treeless or burned-over areas on the forest reserves. On the Cooking Lake forest reserve this year about 21 acres were planted with 65,478 young trees, of which approximately half were jack pine and the remainder white spruce. One and three-quarters acres on the Riding Mountain forest reserve were also set out with some 3,000 jack pine. In addition, 17½ acres in the Cooking Lake forest reserve were experimentally seeded with lodgepole pine. The policy of establishing small local nurseries on the reserves is being steadily developed and this year all the planting material used was produced in the local nurseries, except about 3,000 plants.

GRAZING

A continued decline in grazing on the forest reserves is reported from all the prairie districts. In all these districts, however, the stock left the reserves in good condition. The decline was in part attributed to the good supply of feed on private lands. In British Columbia a grazing policy was inaugurated during the year, and three co-operative stock associations formed.

PUBLICITY

Good results are accruing from the publicity work done in connection with fire protection—increasingly so as the work becomes more aggressive and intensive.

BOUNDARIES

By the provisions of the amendment to the Forest Reserves and Parks Act made during the year, a net addition of 106 square miles was made to the area of the Dominion forest reserves. One new reserve, the Sandilands forest reserve, in southeastern Manitoba, having an area of 187.75 miles, was added, and small areas, originally included in various forest reserves, were withdrawn on the ground of having been found to be suitable for farming.

TREE PLANTING ON PRAIRIE FARMS

A lively interest continues throughout the Prairie Provinces in tree planting; especially is this true with regard to the growing of fruit trees, for which, in these provinces, shelter is essential, and in the planting of field shelters. The number of seedlings and cuttings distributed again exceeded five million. Great success has been obtained in the more recent plantations, of which 75 per cent of those inspected were reported as in a flourishing condition, 19 per cent fairly good, and somewhat less than 6 per cent neglected. Of old plantations, five years old and upwards, inspected, 75 per cent were in good condition, 15 per cent fairly good, and 10 per cent poor. Though no fruit trees are propagated at the nursery station for distribution, some kinds of fruit have been grown experimentally under the protection of shelter-belts, and these competed successfully with similar fruit grown in British Columbia. Evergreen plantations continue to thrive. Reports of injury to plantations indicate damage from snow-break and from the tent caterpillar. Nursery stock, both at Indian Head and Sutherland, made splendid growth. Collection of tree seed was made as usual.

FOREST PRODUCTS LABORATORIES

The Forest Products Laboratories again report an increase in the demand for their services. The requests for technical information and services were greater than in any previous year, and the amount of research and investigative

work also increased. Of the major investigations carried out, a number were continuations of projects begun in previous years. This class of investigation included research on the manufacture of sulphite pulp from jack pine, freeness tests in mechanical pulp manufacture, chemical research on cellulose, and the refining of waste paper stock in the Division of Pulp and Paper. The Division of Timber Physics continued the investigation of kiln-drying and the preparation of the reference collection of microscope slides of woods. The Division of Timber Tests did further work on the determination of the mechanical and physical properties of Canadian woods, the investigation of the strength of glued joints, and the nail-holding power of woods, and the Division of Wood Preservation again pursued researches on the creosote treatment of Canadian hardwoods for top pins and the seasoning of hard maple ties. Major projects taken up for the first time included the development of methods of testing pulp for strength in the Pulp and Paper Division, an investigation of the physical properties of pulpwood with reference to deterioration in storage in the Division of Timber Physics, the effect of red stain and red rot on the strength of jack pine ties in the Division of Timber Tests, and work on the open-tank creosote treatment for preserving wood in the Division of Wood Preservation. A number of minor projects were also taken up. The laboratories also aided greatly in the preparation of the timber exhibit for the British Empire Exhibition being held at Wembley, England. A number of addresses were given by members of the staff at various meetings, and several articles prepared for technical journals.

FOREST RESEARCH WORK

The work of the Research division has increased during the past fiscal year both in scope and quantity. Investigations were continued in Ontario, Quebec, New Brunswick, and on the Dominion forest reserves in the western provinces. The work is directed by the Division of Research at Ottawa, and is carried on at a number of points in the various provinces.

In Ontario this year's research work was confined to the Petawawa forest experiment station in the Ottawa valley. Many plots in the white pine-red pine type were thinned in the course of the study of the effect of thinnings on yield. Experiments in connection with the study of natural and artificial reproduction of desirable species were continued and tentative results were obtained. These will be substantiated by further work. Some of the results of earlier work are now becoming available as the first five-year period since the establishment of the first plots in 1918 is completed.

Much of the Petawawa reserve is either composed of abandoned farm lands or covered with undesirable and inferior species. This year the forest nursery was extended, some eighty seed-beds being made. The stock from this nursery will be used for experimentation with artificial reafforestation of these lands.

In Quebec extensive experimental cuttings were made in co-operation with Price Brothers and Company, Limited. The various recognized methods of cutting were tried on large blocks in an attempt to find the best method of favourably influencing advance coniferous growth.

A small amount of work was done at the Lake Edward forest experiment station in the St. Maurice valley. The results of much of the work at this station are becoming available and will assist in planning future work in the district and type.

In New Brunswick, in co-operation with the Pejepscot Company, Salmon River, comprehensive studies of the contents of piled cords of various-sized trees were undertaken. The information thus obtained will be of great value in estimating the contents of stands in cords in connection with cruising on working plans.

Under financial aid from the Honorary Advisory Council for Scientific and Industrial Research, the provincial forest service has undertaken extensive experiments in reseeding burned areas. This division is co-operating in establishing permanent sample plots to study the results of the work.

The investigation of taper as a factor in the measurement of standing timber has been completed for five of the principal coniferous species. Volume tables in merchantable board feet and total cubic feet, based on this investigation, are now available for white pine (120 years and over), black spruce, white and red spruce, and balsam fir.

During the season a schedule of various studies undertaken or projected was made, and short reports prepared under each heading of the schedule. This report is in mimeographed form. It will be revised from year to year as the results of the earlier research work become available.

An interesting feature of the work of the year was the inauguration of experimental work in thinnings at the Indian Head Forest Nursery Station, the work being conducted in a one-acre Scotch pine plantation, aged 17 years. Work done in the reserves has centred in the selection and treatment of sample plots, experiments with methods of seeding and planting, and the care of the nurseries on the reserves. Cover and type maps have been made on a number of reserves.

FOREST RESOURCES AND STATISTICS

The most important feature of the work of this division during the year has been the preparation of a comprehensive report entitled "The Forests of Canada" for the British Empire Forestry Conference.

This report contains a description of the forest conditions and the systems of forest administration throughout the Dominion, a summary of the forest production and losses through fire, insects, etc., the exports and imports of forest products, and the estimated stand of merchantable timber. The information collected for this report is being kept up to date.

Bulletins have been prepared on the wood-using industries of Ontario and on those of the Maritime Provinces, and material is being collected for one covering Quebec.

The preparation of the report on the forest resources of Ontario has been delayed on account of the work in connection with the British Empire Forestry Conference, but is well advanced.

PUBLICATIONS

During the year a new series of circulars known as "Tree Pamphlets" was instituted. These circulars are designed to be popular in style and are illustrated. Each pamphlet deals with a single tree species and is printed in both the English and the French languages. Six of these tree pamphlets were issued during the year.

Other new publications are Circular 16, "Preservative Treatment of Fenceposts"; Circular 17, "Forest Investigative Work of the Dominion Forest Service," and a circular entitled "The Tree-Planting Division: its History and Work." Bulletin 69 (Care of the Woodlot) was issued in French (Entretien d'un Lot Boisé).

An important part of the publication work of the branch during the year consisted of special publications issued in connection with the British Empire Forestry Conference. A series of pamphlets was prepared for the use of delegates, giving the program of the conference and an outline of the tours taken by the delegates. The report of the Dominion Forest Service delegates to the conference was printed as "The Forests of Canada." The Summary Report of Proceedings of the Conference was also published by this branch.

The pamphlet "Talking Trees" was reprinted. Other means of publicity employed were the distribution of whetstones, aeroplane cards for use particularly at western exhibitions, radio messages, etc.

THE LIBRARY

Six hundred and ninety-six books and pamphlets, 700 photographs, and 3,174 index cards represent the growth of the library during the past year. Ninety-five periodicals were received by subscription and exchange, and newspaper clippings numbered 6,334. The index to the photographs, which now number 17,000, has been brought up to date. The distribution of the "monthly list of accessions to the library" to the field staff, members of the forestry profession, and others interested continues to receive favourable comment. The publication of the bibliographies has been continued, twenty of these lists having now been issued.

STAFF

The total permanent staff of the Forestry Branch for the last year was as follows: —

Head office	61
District inspectors	4
Assistant district inspectors	2
Forest supervisors	20
Foresters and forestry assistants	26
Forest rangers	87
Chief fire rangers	9
Promoters of tree planting	7
Forest Products Laboratories, technical staff	16
Outside clerical staff	35
Other classes	13
	280

APPROPRIATIONS

The appropriation for the fiscal year was $1,088,400. The expenditure was divided as follows:—

Salaries at head office	$ 28,061 38
Travelling expenses	2,600 98
Printing and stationery	13,116 59
Miscellaneous expenses	12,954 73
Fire ranging	208,980 43
Forest reserves	526,854 09
Surveys and research	50,257 61
Tree planting	67,310 26
Forest Products Laboratories	94,326 49
Total	$ 1,004,462 36

The field expenditure in the western provinces exclusive of tree planting on prairie farms and forest products laboratories is divided as follows:—

Manitoba	$ 131,797 80
Saskatchewan	199,714 10
Alberta	264,914 74
British Columbia (Railway Belt)	146,147 61
	$ 742,574 25

The above expenditure is the net amount after deducting the refunds of fire-guarding dues amounting to $29,997.02.

The Tree-planting Division

Norman M. Ross, Chief

Precipitation throughout the prairie regions during 1923 was in most districts above normal. The only district suffering from lack of rain was a very restricted area in southern Manitoba east of the Pembina mountains. Inspec-

tion indicated that conditions generally were very favourable both for new and older plantings. An average of 88 per cent of all stock sent out this season is reported as having started successfully. Individual inspection reports show that out of 5,152 plantations inspected 3,877 are in a flourishing condition, 969 fairly good, and 306 (approximately 5·9 per cent) more or less neglected. Of older plantations five years of age and upward 832 reports show 75 per cent in good condition, 15 per cent fairly good, and 10 per cent poor.

Increasing numbers of inquiries are being received in the office for information relative to tree growing generally, and the number of correspondents seeking advice in regard to fruit growing indicates that farmers are waking up to the possibilities in this line under prairie conditions. On the Nursery at Indian Head over 1,400 pounds of plums were ripened and were of sufficiently good quality to sell locally at the same price as plums shipped in from British Columbia. Standard apples of six different varieties were also ripened at the Indian Head Nursery Station, over 250 pounds being picked. While fruit trees are not propagated for distribution, the small trial orchards here provide a most excellent demonstration to the hundreds of visitors who come to the nurseries during the summer months.

Greater interest is being shown in the establishment of field-shelters to control soil-drifting. In 1923 field-shelters to the number of 107 were set out, and about 100 are to be planted this spring.

Evergreens planted in 1923 have been very successful, and reports from older evergreen plantings indicate that this is the most valuable class of tree for prairie shelter-belts.

The plantations were this year reported as exceptionally free from winter-killing, but owing to the exceptionally heavy snowfall many older belts not protected by a snow-break suffered a good deal from the heavy drifts breaking down the trees.

The tent-caterpillar infestation was more widespread than last year. About two years ago a very bad infestation appears to have started from two centres, one in the Moose mountains in Saskatchewan, the other in northern Alberta in the neighbourhood of Edmonton. Egg masses have been found in nearly all plantations in south-central Saskatchewan, and much injury is expected during the coming season both in natural poplar stands and in the cultivated belts. The caterpillars may be controlled on small areas by using arsenate of lead as a spray, and information to this effect is being disseminated. No other serious insect damage has been reported except where the poplar leaf-beetle was very numerous in Alberta in certain localized areas.

Nursery Work.—Owing to the abundant precipitation nursery stock made a splendid growth both at Indian Head and Sutherland. The maple stand was considerably reduced in numbers, however, as fairly large areas were drowned out, water lying in all the low spots for several days following heavy rains. The ash sown in the fall of 1921, which should have been ready for lifting in the fall of 1923, was a complete failure, so that the actual number of seedlings produced is considerably less than planned.

The coniferous seed-beds all came along well, and seedlings of all varieties made an excellent growth.

Distribution of Broad-leaved Stock.—The figures with respect to the 1923 distribution of broad-leaved stock are as follows:—

Number of applicants receiving trees	4,326
Seedlings and cuttings distributed	5,100,680
Average number per applicant	1,175
Number of applicants on inspection list in 1923	8,791
Number of new applicants on inspection list for 1924 (approximately)	2,500

The broad-leaved material (at Indian Head and Sutherland nurseries) heeled in ready for distribution in the spring of 1924 consists of maple, 605,000; ash, 164,000; Russian poplar, 1,054,300; Northwest poplar, 17,150; laurel willow, 1,293,500; acuteleaf willow, 160,000; red willow, 36,000; caragana, 2,331,500, making a total of 5,661,450.

Distribution of Conifers.—Evergreen transplants were supplied to 285 applicants at a nominal charge as follows: White spruce, 20,400; jack pine, 15,300; Scotch pine, 10,135, a total of 45,835. In addition to these some 3,000 jack pine transplants were shipped to Dauphin, Man., for forest-reserve planting.

Collection of Tree Seed.—Three thousand pounds of Manitoba maple seed were collected at Dauphin, Man., and 318 pounds in the Qu'Appelle valley near Indian Head, Sask.; 2,053 pounds of green ash seed were also collected in the Qu'Appelle valley, and 716 pounds of caragana seed on the Indian Head Nursery Station.

Forty-one bushels of lodgepole pine cones collected in the foot-hills of the Rockies in Alberta were shipped to Indian Head for extraction and produced $11\frac{3}{4}$ pounds of cleaned seed, a very low yield compared to other conifers. One hundred bushels of jack pine cones collected in the Prince Albert district produced 52 pounds of cleaned seed, and 21 bushels of white spruce from the same source yielded $12\frac{1}{2}$ pounds of cleaned seed. Spruce seed has been very scarce for the past two years. There was a fair crop of cones on the Spruce Woods reserve, but seed was practically all destroyed by a grub which bores into the cones.

A quantity of extracted but uncleaned spruce seed was sent in from Entrance, Alberta, and produced 50 pounds of good seed.

Seed Distribution.—Twenty-three pounds of maple seed, 6 pounds of ash seed, and 20 pounds of caragana seed were sent out to 52 applicants in the spring of 1923.

In addition the following amounts of coniferous seeds were shipped for experimental forest plantings:—

To Cooking Lake reserve..	20 lb. spruce
Prince Albert inspection office..	15 lb. spruce
Prince Albert inspection office..	15 lb. jack pine
Spruce Woods reserve..	20 lb. jack pine
Petawawa experiment station..	10 lb. spruce

Experimental Thinnings Begun.—The first thinning experiment was started on the Indian Head Nursery Station on February 28, 1924, in Permanent Plantation No. V. This plot comprises one acre set out to pure Scotch pine in 1906, set approximately 4 feet by 3 feet 6 inches. The growth has been consistently good, and growth measurements have been made every season. In 1923 the measurements showed the average height to be 23 feet 9 inches, the average diameter at breast-height to be 4·64 inches, the maximum height to be 27 feet, and the maximum diameter at breast-height to be 6·08 inches.

Before thinning the plot was divided into three equal parts; one portion is left as a check, one portion was thinned of all dead and suppressed trees, and in the third portion, in addition to dead and suppressed trees, a number of intermediate specimens were removed. All material thinned out which would measure down to $1\frac{1}{2}$ inches in diameter was cut up and piled. Three-fourths of a cord of wood was taken out of the lightly thinned plot and $1\frac{3}{4}$ cords from the more heavily thinned plot. The object of the thinning is to see what the effect will be on the growth of the remaining trees.

Dominion Forests in Manitoba

H. I. Stevenson, District Forest Inspector

During the year 1923 the Porcupine No. 1 forest reserve was transferred for administration from the Saskatchewan to the Manitoba district, and a new reserve, created by Act of Parliament in southeastern Manitoba and named the Sandilands forest reserve, was added to this district. There is now a total of 2,551,965 acres in forest reserves in Manitoba.

Fire Protection.—Weather conditions during 1923 were generally favourable for fire prevention, with the exception of a period during the latter part of May in the southern and southeastern parts of the province and the months of June and July in the northern districts. The heavy snowfall of the preceding winter left the ground well saturated and low-lying areas flooded. The most critical period, during which the largest number of fires occurred, was the last fortnight in May. Strong winds and high temperatures rapidly dried out the dead herbaceous growth of the previous year, particularly on the higher lands. Fires were general over the whole southern area during this period.

A total of 186 fires was reported during the season; of these 69 (37 per cent) were fires burning more than 10 acres each. The total area burned was 103,269 acres, of which 32,453 acres were merchantable timber, 34,717 acres young growth, and the remainder grass land, marsh or muskeg. Of the total fires, 80 (43 per cent) originated from unknown causes, 31 (17 per cent) were caused by railways, lightning and settlers accounted for 26 (14 per cent) each, and the remaining 23 (12 per cent) from miscellaneous known causes.

In several cases during the season it was found necessary to prosecute offenders against the fire laws, and convictions were secured in some thirteen cases. Prosecution was resorted to only where the law had been maliciously and wilfully violated.

Every year a greater degree of assistance and sympathy is being received from the public in connection with fire-prevention work, and this co-operation accounts largely for the reduction in the number of fires in the province.

In 1923 the railway fire inspection work of enforcing the fire regulations of the Board of Railway Commissioners was placed under the supervision of the Manitoba inspection office. This arrangement has permitted better co-ordination of the work.

Aeroplane Patrol.—Seaplanes or flying boats, supplied by the Royal Canadian Air Force, were again used in fire-protection work in the northern and northeastern parts of the province. Only a skeleton ground force was left in the three fire-ranging districts to act as observers and to take charge of any fires which might occur. The sea-planes again demonstrated their value in this class of work in policing and detecting and in carrying fire-fighting crews and equipment for the suppression of fires. Unfortunately only three HS2L flying boats were available for the work, with no spare machines; it was possible therefore to give only partial protection by air patrols.

In connection with flying operations the Royal Canadian Corps of Signals established wireless stations at Norway House, Victoria Beach, and Winnipeg. Continuous service was maintained between these points and the assitance given in this way enabled the air patrols to be carried out to the best advantage.

Improvements.—During the year extensive improvements were made to ranger headquarters. General repairs were made to 175 miles of telephone line; about 10 per cent of the poles were replaced, and the lines were put in good working condition. Approximately 250 miles of road were repaired and five miles of new automobile road graded. This work necessitated the building of 14 new bridges and 42 culverts of varying sizes. One hundred and sixty-eight miles of fireguard were reploughed and 38 miles of new fireguard cut.

Silviculture.—The past year has shown an increase over the previous year in the number of permits issued both for saw-timber and firewood, particularly the latter. This extensive demand for fuel has enabled the reserves to dispose of large quantities of burned timber and diseased aspen or poplar. In order to encourage the cutting of this diseased aspen and remove it from the reserves, areas have been set aside in certain localities where settlers may secure fuelwood free from dues. This is an assistance to the settlers during the present period of financial depression, and the removal of this diseased wood is an advantage to the reserve.

The technical staff has continued the investigative work of previous years, and much valuable information has been recorded. Further experimental sample plots have been located and marked, and records secured for the study of site, density, growth, etc., of the different species.

A number of experimental areas were planted under different conditions of soil-cover, etc., all available stock from the Indian Head Nursery being used.

Particular attention has been paid to seeding by broadcasting, drilling, and other methods, and a large number of plots were seeded under different conditions this year. Encouraging results have been obtained.

Surveys.—Traversing roads and trails and locating and tying in various lakes and rivers occupied considerable time of the reserve staffs. This work has been necessary in order to correct the early maps of the various reserves and to establish permanent points and boundaries from which future work can be carried on. Part of the boundary of the new Sandilands reserve was surveyed and marked with permanent iron posts.

By sketching from seaplanes on their regular fire patrols an excellent map of some 1,200 square miles of country north of lake Winnipeg was obtained. Topographical features, forest-type boundaries, etc., were plotted with reasonable accuracy.

During the summer a detailed reconnaissance was made of a number of townships in the northern part of the Duck Mountain forest reserve, an estimate of timber in this area being required and also information for a new forest-cover map now being completed. Rapid reconnaissance surveys were also made of several new areas in the province by the regular staff.

Recreational Uses of Forest Reserves.—Summer resorts already established in the different forest reserves continue to grow, necessitating the laying out of additional lots. Excellent cottages are being built, usually exceeding in value the minimum set in the forest-reserve regulations. The use of the forest reserve for summer-resort purposes is exceedingly popular and has become firmly established. Applications are continually being received from different localities to establish other summer resorts.

As the roads in the reserves are improved and made fit for automobile traffic, visits to the reserves for camping, picnics, etc., are becoming a regular habit of the people even from long distances, and this traffic is particularly heavy on Sundays and holidays.

Fish and Game.—Fishing on forest reserves provides an interesting pastime for campers and settlers in the vicinity of the reserves. The measures taken to restock and protect fish in the different lakes have been successful, and the majority of the lakes are well stocked.

Small game, such as prairie chicken, partridge, etc., has increased very rapidly in the last few years, and the reserves are now well supplied. Rabbits, which had practically disappeared in 1922, are now numerous, and, with their return, fur-bearing animals, which depend on them for food, are also returning and are plentiful. Unluckily the larger animals, moose, elk, and deer, are diminishing, owing to the encroachments of settlement.

83305—12—7

Grazing.—The year 1923 again showed a falling off in the number of animals grazing on forest reserves, although practically the same number of permits was issued. Owing to the continued wet season the range remained in excellent condition, and all stock left the reserve in splendid shape.

Publicity.—Special attention has been given to publicity during 1923. It is realized that there is little hope of securing proper fire protection without the assistance and sympathy of the public. A campaign of education was therefore undertaken, and by lectures, distribution of literature, and posters an endeavour has been made to inform the public of the value of the forests and of the enormous annual fire losses. The advantage of this publicity campaign has already been observed, and it is felt that through it, to a large degree, the sympathetic interest of the public has been secured.

Dominion Forests in Saskatchewan

C. MacFayden, District Forest Inspector

The year under review was one of the most generally satisfactory in the record of the work of the Forestry Branch in Saskatchewan.

Thirty-one sections considered suitable for agriculture were withdrawn from the Beaver Hills forest reserve. Applications for the withdrawal of certain quarters, sections, or blocks that are represented as of agricultural value continue to be made, though in lessening numbers. These lands are being examined and when found as represented are promptly withdrawn from reserve. At the close of the year a somewhat extensive tract lying between Hudson Bay Junction and Peesane is under review as to its agricultural value and the advisability of continuing its reservation, as are also several small areas.

Fire Protection.—During the winter and early spring the protection plans of the district were thoroughly gone over, revised, and enlarged. The fire season opened in the middle of April and the fire-hazard grew steadily more severe until its culmination about May 23. After this date frequent rains occurred, removing all danger from fire. From the middle of April to the last week of May, the situation was critical, and for a week centering on May 23 bid fair at times to get beyond control.

There were altogether 178 fires reported—103 from the reserves and 75 from Dominion lands outside of these. On the reserves a total area of 103,000 acres was burned over, as against an average of 182,000 acres for the past ten years, although the fire-hazard in 1923 was abnormally severe. Of the 103,000 acres burned, approximately one-half was open grass land, muskeg, or barren. The area (1,000 acres) of the average fire, high though it is, compares favourably with the average for the preceding nine years, namely 2,800 acres.

The 75 fires reported on Dominion lands outside of the reserve burned over 165,000 acres, fully one-half of which carried no merchantable timber nor valuable young growth.

All but two of the fires reported during the year occurred prior to the second week in June, bearing out the past experience that the period of greatest fire danger is from the middle of April to the end of May.

Improvements.—The improvement work accomplished during the year consisted very largely of increasing transportation and communication facilities and constructing and maintaining fireguards, lookout towers, and other improvements, more directly aiding in fire protection. The telephone system on the Big River, Porcupine, Nisbet, and Pines forest reserves was extended by the addition of some seventy miles of new line. Existing roads, amounting in all to 118 miles, were repaired and improved, and extensive improvements amounting almost to reconstruction made to several old roads that had fallen into an unserviceable shape or were poorly located.

Following up the work of 1922-23 more funds and time were spent on fireguards than ever before. Experience is showing that a very large percentage of the fires originating outside the reserves can be prevented from entering by a well constructed and well maintained fireguard. This applies particularly to ground fires in the early spring.

The lookout system covering the Pines and Nisbet reserves was further improved and gave such satisfaction that every effort is being made to inaugurate a similar system covering other reserves.

Grazing.—Owing to the general and marked depression in the live stock industry the use of the reserves for pasturage continued to fall off, as it has for the past three years. During the year 706 permits were issued, representing 26.223 head of stock. Owing to the abundance of moisture during the summer there was good feed everywhere and stock came off the range in good shape.

One hundred and ninety-seven permits were issued authorizing the cutting of 5,562 tons of hay, but this is a use of the reserves that is gradually disappearing.

Timber Sales and Permits.—During the year the timber-cutting operations on the various reserves were the most active on record. At the close of the year there were thirty-six timber sales in good standing, twenty-nine of which had been active during the winter. All products were in good demand, particularly saw-timber, railway ties, lathwood, and fuel. An outstanding feature is the demand for black spruce for the manufacture of lath, a fact that enhances the value of a species hitherto looked on as of little use in this district..

The largest sale yet made in Saskatchewan was consummated during the year and covered timber to the estimated amount of 16,000,000 feet. In connection with this sale it is interesting to note that brush disposal by burning is being carried out satisfactorily and without complaint from the operator.

Permits issued to settlers and others for the cutting of sawlogs, building logs, posts, poles, rails, and fuel numbered 1,092. By far the greater part of the material so cut, including over 19,000 cords of fuel, was fire-killed and its removal was encouraged as a means of reducing the fire-hazard. A careful study of the cost of brush disposal by burning was made during the year on both large and small operations.

Nurseries and Planting.—No planting was done during the year, but a very real effort was made to put the reserve nurseries into good shape. While this work is yet new, it is on the whole meeting with fair success and in a few cases most excellent results have been attained. No stock has yet been transplanted from the seed-beds, but the latter are estimated to have at least 750,000 seedlings.

Dominion Forests in Alberta and British Columbia

C. H. Morse, District Forest Inspector

ALBERTA

The work of the Forestry Branch in Alberta falls into three main divisions, namely, the protection and administration of the forest reserves, the protection of timbered lands not included in the forest reserves, and the protection, in co-operation with the Board of Railway Commissioners, of timber along railway lines. The second of these fields of activity is not limited to the province of Alberta, but extends into the Northwest Territories, and covers the main waterways, including the Athabaska, Peace, and Mackenzie rivers.

83305—12—7½

Fire Protection.—The winter of 1922-23 was quite mild, with but little precipitation. The spring opened up fairly early and during April and the first part of May there was a decided fire danger. By the end of May, however, wet weather set in which continued until the 1st of September, with occasional very heavy downpours. After that date the weather was very dry; in fact there was practically no precipitation during the autumn. There were no fires reported in June, July or August on the forest reserves. In the north country the wet weather did not set in until about June 1, and the spring fire-hazard was longer than in the south. The summer rains were not so heavy in the north, and many fires occurred during each of the summer months, although the most favourable one was July. May was the worst month and October the next in fire-hazard.

A total of 36 fires was handled by the forest-reserve staff, the area burned over being 10,000 acres. Of these fires 20 were caused by railways, 5 by campers, 4 by hunters, and 2 by settlers. It should be pointed out, however, that of the 20 railway fires only one exceeded ten acres in extent, whereas 3 of the campers' fires exceeded that acreage.

In the Edmonton district the staff handled 635 fires, of which 73 were large (over ten acres) and 562 were small. Of the large fires in this district 16 were charged to campers, 16 to settlers, and 13 to railways; 14 were of unknown origin, 3 were incendiary, and 4 were caused by hunters. Of the small fires 214 were caused by settlers, 134 by railways, and 110 by campers; 6 were incendiary and 89 of unknown origin.

Aeroplane Patrols.—The system of aeroplane patrols, through the co-operation of the Department of National Defence, was continued during the fire season with excellent results. A few patrols were made during the spring fire season in the month of April. On account of copious rains in May, June, and July no forest patrols were carried on during those months. Patrols were resumed on August 30 and were continued through a dangerous autumn fire season up to November 28. The work carried out by the Air Service was most valuable. With aeroplanes on patrol the rangers were assured that the less accessible portions of the reserves were being constantly watched, and their own time could be devoted to areas of particular hazard or to other work of administration or forest improvement.

Improvements.—On account of the early summer rains, which became torrential in the south country, very little improvement work could be carried out until the late summer and autumn. In addition to this delay, floods caused a very great deal of damage to roads, trails, and bridges, and repairs had to be made at once lest a fire season should find the staff without means of rapid communication. Many of the trails and roads had to be wholly reconstructed on higher ground, although in other cases only short diversions around washouts were necessary. Flood damage was not so severe in the north, and much more new construction was carried on in that portion of the province.

Grazing.—During the summer season there were grazed on the forest reserves of Alberta 24,520 head of cattle, 7,447 horses, and 1,800 sheep, a considerable reduction as compared with the previous year's business. On account of the open winter of 1922-23 stock entered the reserves in a very fair condition. Fine weather was experienced in the latter part of April and the first part of May. Then summer rains set in which lasted until the middle of August. As a result the growth of grass was excellent. Considerable damage to range resulted in some districts from severe hail-storms. The latter part of the summer and the fall was extremely dry, but there was no lack of feed on the forest ranges. Stock left the forests in good condition.

Silviculture.—The mapping of the forest cover of the reserves was continued last summer. About eight townships in all were mapped on the Clearwater, Brazeau, and Lesser Slave forests.

On the Cooking Lake and Cypress Hills forest reserves the reafforestation work which was started five years ago was continued last season.

There has been a decrease in the amount of timber cut under the authority of timber sales in the district. This is due in part to the fact that the larger and more accessible areas of fire-killed timber in the vicinity of coal mines have already been salvaged for mine props, and large cuts are no longer being made. The larger part of this year's cut under timber sale has been mature and over-mature spruce and pine for saw-mill supply. Twenty-one sales have been in operation, of which 14 have supplied local mills, 5 provided mining timber for coal mines, and 2 furnished ties for the Canadian National railway. The operations have everywhere been satisfactory with regard to close utilization and brush disposal, and all the sales have been a success from a financial point of view.

There has been a satisfactory increase in the number of timber permits issued during the year, and also in the amount of timber removed under the authority of permits. The larger part of this business has been in connection with fire-killed timber for fuel and mine props. As the larger areas of burned timber have been largely cut over under timber sales the smaller areas are now being handled under timber permits.

BRITISH COLUMBIA

In British Columbia the area under the administration of the Dominion Forestry Branch is confined entirely to the "Railway Belt."

Fire Protection.—The past season was unusually favourable, with only a very short period of high fire-hazard. No serious fires occurred other than one fire in the Coast district, which was confined to cut-over land and did very little damage to standing merchantable timber. Precipitation during the past season was very much greater than during any of the previous four years and was spread out over the growing season.

The number of fires fought and extinguished totalled 273. This was a decrease of 316 from the previous year and a decrease of 193 from the average of the previous four years, also a decrease of 12 fires in comparison with the wet years of 1917 and 1918 when the reporting of all fires was not as reliable. The proportion of "large" fires for the season (fires which attained a size of ten acres or more, or caused any expense) was 32 per cent or a total of 85. Railways caused the greatest number of outbreaks, 70 (25 per cent of the total) being attributed to this cause. However, only 4 of these fires were classed as large fires, the remainder being extinguished in the incipient stage. Fires from natural causes (lightning) come second in number with 46, a percentage of 16.9. Other causes vary from 12 per cent for fires from causes unknown, downwards, and it is encouraging to note in this list of causes that incendiary fires total only 18 in number, less than 5 per cent against 101 fires the previous season, or 17 per cent. The total area burned over was 7,983 acres, which included old burns, slash areas, and merchantable and young growth, compared with 109,474 acres in the previous season. The area of merchantable timber burned totalled 876 acres, and the area of young growth 1,085 acres. The remainder was old burn, slash, etc. A correspondingly small loss is shown in merchantable timber. Approximately 5,000,000 feet board measure was destroyed against 47,000,000 feet board measure in 1922 and 148,000,000 feet board measure in 1920. The small loss of timber this season in comparison with the total acreage burned over and with the figures for previous seasons is indicative of greater efficiency in fire control.

Improvements.—The improvement work for the British Columbia forest reserves was not very extensive during the past season in comparison with

other years. This is due to the original program of permanent improvements being nearly completed. The work during the past season was principally maintenance work on existing permanent improvements. Many miles of trails were put in good condition, telephone lines gone over, and repairs made to buildings and fences. Good progress was made in clearing operations around headquarters sites for pasture purposes and for the raising of feed for government live-stock. Work was commenced on the building of the Joss Mountain lookout in the Salmon Arm district. This project constitutes the last primary point to be occupied in the district for fire-detection purposes.

In the Revelstoke district the lookout project started in the previous season on Cartier mountain was practically completed. This lookout is the highest of its kind in the Dominion, being at an elevation of nearly 9,000 feet.

Silviculture.—There has been a marked increase in timber-sale business during the past year, fifteen new sales having been awarded. The usual requirements of this Branch with regard to close utilization and brush disposal have been satisfactorily and willingly carried out in all cases by the operators. The timber-permit business also shows an improvement over previous years.

During the season a forest-cover map was undertaken of the Monte Hills reserve. Exhaustive studies were made for the areas covered of the various timber types. The work of establishing sample plots for the study of growth conditions and various silvicultural methods was continued, numerous additional plots being laid out. This inspectorate now has plots covering almost every condition under which timber of the various species grows in the district, and in future years very valuable information will be obtained from the data compiled on these plots. A great deal of experimental planting was also carried on under various silvicultural systems.

The past season was a fair year for the collection of seed. A large quantity of seed was collected and prepared ready for shipment both in the coastal region and in the interior. From the seed-extraction plant at New Westminster approximately 3,500 pounds of Douglas fir seed, 1,250 pounds of Sitka spruce seed, and 62 pounds of lowland fir seed were shipped to the British Forestry Commission. A shipment was also made to the New Zealand Government of 250 pounds of Douglas fir seed and a smaller amount of Western red cedar seed. From the interior-district seed collections, various small amounts of seed of numerous species were shipped to points in Great Britain, Holland, Finland, and the Irish Free State for use in experimental planting to determine which strains of species give the best results under climatic conditions abroad.

Grazing.—A grazing-permit policy for the forest reserves in British Columbia was inaugurated during 1923. Grazing regulations were not put into effect generally for all forest-reserve areas, but an attempt was made to bring before the ranching public the benefits and advantages of regulated grazing under the forest reserves grazing regulations. Several communities have organized themselves into local associations and have made request that certain range divisions should be brought under the regulations. Forage conditions on the reserves containing stock range were excellent. Permits issued during the summer season amounted to 20, covering 726 head of cattle, 50 horses, and 942 sheep.

Recreational Uses.—The forest reserves drew their usual number of tourists and summer-resorters, particularly at Paul lake on the Niskonlith forest reserve and Trout lake on the Long Lake reserve. Fishing conditions were good at Paul lake, but it will take a number of years to bring Trout lake back again to its original state. Increased use was made of the reserves for camping.

SESSIONAL PAPER No. 12

Forest Products Laboratories of Canada

W. Kynoch, Superintendent

The steadily increasing demand for the services of the laboratories, to which reference has been made in reports for recent years, was again in evidence during 1923-24. The number of requests for technical information and service dealt with was again greater than in any previous year. The amount of research and investigative work conducted was relatively greater than in the preceding twelve months.

A brief review of the chief problems investigated is given hereunder.

Sulphite pulp from Jack Pine.—Object: To develop a sulphite cooking process which will yield a pulp of good commercial quality from jack pine. Work was carried to a conclusion on a laboratory scale. A process yielding a pulp of good quality was worked out and findings confirmed by means of a series of check cooks. Commercial-scale trials, in co-operation with a pulp company, were pending at the close of the year.

Freeness as a Control Test in Groundwood Production.—Object: To determine the feasibility of applying the freeness test as a control in the manufacture of mechanical pulp. A considerable amount of experimental work was conducted and a material advance towards the objective made. Findings led to careful consideration of the subject by the Technical Section of the Canadian Pulp and Paper Association. This resulted in the appointment of a "Committee on Standardization of the Freeness Test," a member of the laboratory staff being appointed chairman.

Pulp Testing.—Object: To develop methods of testing pulp for strength suitable for adoption as standard. The investigation was directed along the line of determining the most suitable pressures to adopt as standard in the preparation of test sheets. Investigations as to the best equipment and procedure in the formation of test sheets were also conducted. Work under these heads was successfully completed for the various kinds of commercial pulp made in Eastern Canada. Work on the effect of drying factors on strength was begun in the latter part of the year.

Chemical Research on Cellulose.—Object: To add to the knowledge of the constitution of the cellulose molecule and of the chemistry of the cellulose complex of Canadian woods generally. Research on the chloral condensation products of cellulose yielded valuable information. An interesting minor result was the development of a delicate colour test for the presence of chloroform and chloral hydrate.

Refining of Waste Paper Stock.—Object: To develop the best method of recovering good paper stock from the condemned paper currency withdrawn from circulation by the Department of Finance; and to ascertain if this method can be profitably used on a commercial scale.

Work on a laboratory scale was completed and a washing apparatus of semi-commercial size was designed and constructed. An experimental wet machine was installed. A series of semi-commercial pulping trials was conducted at Ottawa in co-operation with the Department of Finance, and plans for the placing of the whole operation on an efficient producing basis were formulated. Action to put these plans into execution was pending at the close of the year.

Testing New Materials for Paper.—The use of Canadian talc in place of imported China clay as a filler for certain classes of paper was investigated and, with the co-operation of manufacturing and printing firms, was carried to com-

mercial trials with most encouraging results. A blotting paper of good quality, made entirely from wood-pulps, was developed, further work on the subject, however, remaining to be done. Preliminary work on the utilization of straw for papermaking was carried out. Extensive papermaking trials, in connection with the above investigations were conducted and advances were made in the technique of paper-fibre analysis.

Preparation of Reference Collection of Microscopic Slides of Woods.—Object: To build up a collection of authentic microscope slides of the important commercial timbers of the world and of photomicrographs illustrative of anatomical features; to study the anatomy of woods. During 1923-24 slides of a number of important foreign woods were prepared, and a supply of duplicate mounts of native woods was also made with a view to exchange with timber-research organizations in other countries.

Kiln-Drying.—Object: To investigate the scientific principles involved in kiln-drying and to improve present kiln-drying practice. A detailed co-operative study of kiln operations was conducted at a number of industrial plants and assistance in the solution of various drying problems given.

Physical Properties of Pulpwood with Reference to Deterioration in Storage.—Object: To secure information as to the changes in the physical properties of stored spruce and balsam fir pulpwood which are brought about by decay; to ascertain the relationship between these changes and the pulping qualities of the wood. An extensive series of physical determinations on samples of sound and decayed pulpwood was made.

Mechanical and Physical Properties of Canadian Woods.—Object: To determine, by means of an exhaustive series of mechanical and physical tests, the strength functions of Canadian commercial timbers. During 1923-24 upwards of 8,000 tests and determinations were made.

Glued Joints.—Object: To investigate the value of glues of the various classes for joint work. Hide and casein glues received further attention, while blood-albumen glue was investigated in a preliminary way. Woods in common use in cabinet and furniture work were employed for the joints. The investigation included tests to obtain information on the effect of age on the adhesives. Over 800 tests were made during the year.

Nail-Holding Power of Woods.—Object: To ascertain the relative ability of various Canadian woods to retain nails. A number of woods of wide industrial use was employed while the nails were of various types. Over 1,300 tests were made and the work will be continued.

Effect of Red Stain and Red Rot on the Strength of Jack Pine Ties.—Object: To determine the extent to which red stain and red rot reduce the strength of jack pine ties. The investigation, as planned, was concluded. It became evident, however, that inquiry should be made into certain other phases of the problem, including the effect of steaming under pressure on the strength of the red-stained wood. Further work will therefore be necessary.

Wood Preservatives.—An analytical study of various proprietary wood preservatives was carried out with the object of securing information on their probable value for the treatment of timber. Considerable attention was given to analytical examination of creosote oils and refined tars for commercial use in creosote-tar mixtures. A portable post-treating plant for demonstration and other work was designed and constructed. Work on the open-tank creosote treatment of spruce for railway ties was done with the object of ascertaining whether or not such treatment would be likely to effect economy in maintenance in districts remote from pressure plants. Following on the work done last year further work on the creosote treatment of Canadian hardwoods for top-pins

was conducted, attention being given to pressure treatment. Penetration tests with creosote oils were made on red pine and yellow birch for use as pole-anchor planks. Further work was done in connection with a seasoning study on hard maple ties which had been previously made. The drying of green birch by treatment with hot waxes was investigated experimentally as also was the possibility of modifying the physical properties of certain Canadian woods with a view to rendering them suitable for pencil making. Further work on the colouring of yellow birch throughout by means of heat treatment with various materials also received attention.

Exhibits.—Early in the year the exhibit specialist was loaned to the Exhibition Commissioner for the purpose of giving undivided attention to the designing and preparation of the timber exhibit for the British Empire Exhibition to be held in London during 1924. The laboratories assisted by selecting and identifying wood material, making photomicrographs, preparing a collection of woods in the form of cubes specially surfaced for examination with the microscope by reflected light, and by preparing several thousand wood specimens labelled with name of timber.

In addition to the work for the British Empire Exhibition a small public exhibit previously prepared was revised and improved, and various additions made to the permanent exhibit at the laboratories, including collections of Brazilian and British Guiana woods. Requests from schools and institutions for authentic hand specimens of Canadian woods continued, and a number of sets was prepared and distributed in response.

In connection with the endeavour of the authorities to enlist the co-operation of the public in reducing the enormous monetary wastage occasioned by forest fires, the laboratories prepared one hundred "wall sets" for display at railway stations and other public places. These sets indicated, by means of actual wood specimens, the quantity of each kind of timber utilized and destroyed by fire respectively in Canada each year.

Library.—The reference library, which deals with the technology of woods, the products therefrom, and related matters, was materially extended and improved.

Information Furnished.—The demand of manufacturers and others for reliable technical information relating to woods and products made or derived from woods is constantly increasing, and the supplying of such information is an important function of the laboratories. The study, research, and investigative work which has been in progress at the laboratories during the past ten years has yielded a large fund of information concerning Canadian timbers which is nowhere else available and which is at hand for reference in dealing with any inquiries received. The number of such inquiries given attention during the year considerably exceeded 500, a greater number than in any previous year.

General.—Since the establishment of the laboratories more than ninety articles, bulletins, etc., have been published, and a substantial contribution to this total was made during 1923-24. A number of addresses was also given at meetings of technical and other bodies.

Free technical services, such as the identification of woods and the analysis of papers, are operated for the benefit of manufacturers and others, and were much in demand during the year.

The research and other activities of the laboratories involve a good deal of special photography and photomicrography for record and other purposes and a high standard in this work is maintained. The work of the year included a set of photomicrographs illustrative of the minute structure of Canadian timbers, for use at the British Empire Exhibition.

TABLE I—STATEMENT OF REVENUE, FORESTRY BRANCH, FISCAL YEAR ENDED MARCH 31, 1924

Reserve	Timber sales	Timber fees and dues	Timber seizures	Grazing permits and trespass	Hay permits and seizures	Surface rentals	Special uses	Nursery stock	Unclassified	Total
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Turtle Mountain		381 00		1,812 00	203 25	67 75	67 00			2,531 00
Spruce Woods		283 80	4 50	238 00	121 25					647 55
Riding Mountain	1,090 00	10,097 77	939 20	305 50	486 75	448 45	596 80			13,964 47
Duck Mountain		4,074 72	96 28	178 00	257 75	301 47	39 00			4,947 22
Porcupine No. 1	106 75			16 36	15 00		5 00			143 11
Sandilands		132 25	4 00							136 25
Moose Mountain		353 21	20 00	566 20	141 00	124 60	17 00		741 00	1,963 01
Beaver Hills		122 90		184 05	120 00		11 00			437 95
Porcupine No. 2	2,898 32	1,840 51	25 00	112 86	283 25		219 30			5,379 24
Pasquia	32,036 20	2,739 26	75 00	46 61	344 75		106 50			35,348 35
Fort à la Corne	593 24	1,612 74	21 71		16 00		58 75			2,302 44
Nisbet-Pines	497 23	4,034 27	75 39	536 76	136 25		175 10			5,455 00
Big River	408 52	867 53	55 06	146 76	369 00		40 50			1,887 37
Steep Creek		4 80								4 80
Sturgeon	732 00	121 21		224 10	81 50		29 00			1,187 81
Keppel		29 25		361 58			8 00			398 83
Manito		265 88	6 80	2,187 72	36 75		47 00			2,544 15
Dundurn		139 50		398 40	65 25		10 00			613 15
Seward				1,041 62	37 25		30 00			1,108 87
Elbow		40 50		879 00	36 75		236 60			1,192 85
Big Stick				5,474 56	6 00		54 00			5,534 56
Cypress Hills		5,125 24	201,65	3,005 37	3 50	45 00	83 20			8,466 96
Cooking Lake		3 00		1,105 91	135 50		3 00			1,247 41
Crowsnest	328 15	2,407 82	142 00	8,749 48	2 25	36 86	417 50			12,084 06
Bow River	500 00	478 01		5,367 52	26 50		46 15			6,418 18
Clearwater	2,433 76	868 57		1,430 06	25 25	1,114 83	336 29			6,208 76
Brazeau	9,241 35	1,592 73		326 95		886 68	419 30			12,467 01
Athabaska	1,134 61	37 50		94 44	18 00		16 00			1,300 55
Lesser Slave	5,128 45	2 00		29 60	21 00		13 00			5,194 05
British Columbia Reserves	4,726 83	148 75	17 70	297 31	81 00	211 45	276 06			5,789 10
Indian Head Nursery								1,635 31	2,348 00	3,983 31
Total	61,855 41	37,804 72	1,687 29	35,116 75	3,070 75	3,267 09	3,361 05	1,635 31	3,089 00	150,887 37

TABLE 2—STATEMENT OF TIMBER PERMITS ISSUED IN FOREST RESERVES, FISCAL YEAR ENDED MARCH 31, 1924

Reserve	No. of permits		Kinds and quantity of timber authorized to be cut									Dues and fees
	Free	Paid	Poles or rails	Fence-posts	Saw-timber	Railway ties	Mine timber	Lath	Building logs	Fuel-wood		
										Green	Dry	
					Ft.B.M.		Lin. Ft.	Pieces	Lin. Ft.	Cords	Cords	$ cts.
Turtle Mountain		35			7,500						493	381 00
Spruce Woods		41		650	33,350				2,000		282	283 80
Riding Mountain	210	875	1,200	33,028	2,261,969	80,000			61,586	1,208	5,364	10,097 77
Duck Mountain	37	230	5,000	9,547	742,082				12,285	45	1,382	4,074 72
Sandilands		30		300					350		163	132 25
Moose Mountain		80		4,483					7,290	242	73	353 21
Beaver Hills		29		250					5,380	99	12	122 90
Porcupine No. 2	40	140	11,700	10,650	403,154				24,720	19	1,665	1,840 51
Pasquia	23	115	400	22,825	9,616,946			392,392	37,026	21	9,124	2,739 26
Fort à la Corne	24	215	2,600	11,117	4,409,000				51,156	19	1,460	1,612 74
Nisbet-Pines	14	405	12,343	23,420	16,972				30,634	110	2,640	4,034 27
Big River	8	42	5,000	4,000	101,000				19,992		2,804	867 53
Steep Creek												4 80
Sturgeon	4	20	700	1,900					6,808		24	121 21
Keppel	1	8								22	17	29 25
Manito	15	64	150	8,750					2,250	217	55	265 88
Dundurn	3	31								207		139 50
Elbow		21		450							84	40 50
Cypress Hills	18	489	56,265	27,748	391,788		686,000		703,446	399	1,466	5,125 24
Cooking Lake		1									2	3 00
Crowsnest	3	239	12,280	28,270			300,000		37,828	144	570	2,407 82
Bow River	19	49	18,830	6,590	900,000		2,152		41,410		365	478 01
Clearwater	1	101	4,180	52		1,000	100,143	100,000	138,956		461	868 57
Brazeau		42	957	4,342	250,000	7,680	883,398		63,435			1,592 73
Athabaska		2									71	37 50
Lesser Slave	2											2 00
British Columbia Reserves	16	14	39,075	1,221	260,000	95,000			6,504		149	148 75
Total	448	3,318	170,680	199,593	19,396,761	183,680	1,971,693	492,392	1,253,056	2,752	28,696	37,804 72

TABLE 3—STATEMENT OF GRAZING PERMITS ISSUED IN FOREST RESERVES, FISCAL YEAR ENDED MARCH 31, 1924

Reserve	No. of permits	Number of Stock				Dues and fees collected
		Cattle	Horses	Sheep	Total	
						$ cts.
Turtle Mountain	82	1,142	79	.....	1,221	1,789 00
Spruce Woods	10	107	23	.....	130	238 00
Riding Mountain	32	451	99	.....	550	305 50
Duck Mountain	14	342	20	.....	362	178 00
Moose Mountain	56	1,182	89	.....	1,271	566 20
Beaver Hills	27	305	55	.....	360	184 05
Porcupine No. 2	8	192	52	.....	244	112 86
Pasquia	12	68	10	.....	78	46 64
Porcupine No. 1	2	30	2	.....	32	16 36
Nisbet-Pines	38	1,074	129	1	1,204	536 76
Big River	7	320	8	.....	328	146 76
Sturgeon	26	473	33	.....	506	224 10
Keppel	42	561	176	.....	737	361 58
Manito	114	3,315	872	25	4,212	2,154 44
Dundurn	13	567	274	.....	841	398 40
Seward	66	895	436	.....	1,331	1,041 62
Elbow	106	1,370	450	.....	1,820	879 00
Big Stick	214	5,050	1,751	4,650	11,451	5,459 46
Cypress Hills	131	4,047	1,722	.....	5,769	2,927 87
Cooking Lake	88	1,596	401	.....	1,997	1,105 91
Crowsnest	164	9,151	2,410	1,100	12,661	8,749 48
Bow River	122	7,642	3,028	.....	10,670	5,367 52
Clearwater	227	894	1,096	.....	1,990	1,430 06
Brazeau	114	47	324	.....	371	326 95
Athabaska	9	40	116	700	856	94 44
Lesser Slave	2	55	2	.....	57	29 60
British Columbia Reserves	16	731	75	942	1,748	297 31
Total	1,742	41,647	13,732	7,418	62,797	34,967 37

TABLE 4—STATEMENT OF TIMBER CUT ON FOREST RESERVES UNDER AUTHORITY OF TIMBER SALES, FISCAL YEAR ENDED MARCH 31, 1924

Reserve	Previous sales still operating	Sales made current year	Saw-timber	Mine Timber			Railway ties	Telephone poles	Dues collected
				Props.	Lagging	Lagging			
			Ft. B.M.	Lin. Ft.	Cords	Lin. Ft.	Ft.B.M.	Lin. Ft.	$ cts.
Riding Mountain	1	1	18,650	.....	.....	.....	.....	.....	50 00
Big River	.....	2	.....	.....	150	.....	3,820	.....	104 92
Sturgeon	.....	2	.....	.....	.....	.....	.....	.....	50 00
Fort à la Corne	3	3	288,771	.....	.....	.....	.....	.....	396 24
Porcupine	2	2	223,186	.....	.....	.....	.....	.....	1,762 48
Pasquia	5	16	11,765,985	.....	387	.....	.....	.....	9,368 25
Nisbet-Pines	1	1	14,214	.....	.....	.....	2,895	.....	236 00
Brazeau	3	4	4,240,522	47,672	.....	23,184	.....	.....	3,378 42
Bow River	.....	1	.....	.....	.....	.....	.....	.....	.....
Crowsnest	2	1	22,857	.....	.....	.....	.....	.....	217 15
Clearwater	4	.....	554,900	89,347	.....	.....	.....	.....	2,383 76
Athabaska	1	.....	.....	.....	.....	.....	.....	.....	1,134 61
Lesser Slave	1	1	.....	.....	.....	.....	.....	.....	3,543 31
British Columbia Reserves	2	13	146,878	6,275	.....	.....	51,674	44,440	3,026 30
Total	25	47	17,275,963	143,294	537	23,184	58,389	44,440	25,651 44

SESSIONAL PAPER No. 12

TABLE 5—STATEMENT SHOWING QUANTITY OF TIMBER SOLD AND REVENUE DUE FISCAL YEAR ENDED MARCH 31, 1924, ON LICENSED TIMBER BERTHS WITHIN DOMINION FOREST RESERVES

MANITOBA

Reserve	Timber berths	Area in reserve	Quantity sold			Dues payable	Rent payable	Total payable
			Lumber	Lath	Other products*			
	No.	Sq. Mls.	Ft. B.M.	Pieces		$ cts.	$ cts.	$ cts.
Riding Mountain	2	22·75					227 50	227 50
Duck Mountain	11	107·59	924,958			744 98	1,075 90	1,820 88
Total	**13**	**130·31**	**924,958**			**744 98**	**1,303 40**	**2,048 38**

SASKATCHEWAN

Porcupine and Pasquia	41	850·23	28,317,474	15,747,533	42,488	42,317 34	8,502 20	50,819 54
Nisbet-Pines	4	80·69	62,299		7,007	909 06	173 15	1,082 21
Total	**45**	**930·92**	**28,379,773**	**15,747,533**		**43,226 40**	**8,675 35**	**51,901 75**

ALBERTA

Crowsnest	10	226·92	2,312,753	589,256	1,723,569	5,465 73	2,269 20	7,734 93
Bow River	12	266·73	3,260,016			2,490 50	2,667 30	5,157 80
Clearwater	4	371·52	52,180		319,444	20,222 13	3,715 20	23,937 33
Brazeau	10	126·40			166,512	6,183 94	1,264 00	7,447 94
Total	**36**	**991·57**	**5,624,919**	**589,256**		**34,362 30**	**9,915 70**	**44,278 00**

BRITISH COLUMBIA

British Columbia Reserves	**11**	**128·32**	**1,377,118**			**1,377 11**	**1,283 20**	**2,660 31**

ALL DOMINION FOREST RESERVES

Grand Total	**135**	**2,181·15**	**36,396,798**	**16,336,789**		**79,710 79**	**21,177 65**	**100,888 44**

* The figures in this column indicate the number of units on which dues were calculated. They include 1,120 posts, 7,621 cords of fuel-wood, 1,283 cords of slabs, 544 cords of edgings, 45 cords of pulpwood, 1,827,792 linear feet of mine timber, 417,646 railway ties, and 2,969 rails.

PART IV

WATER POWER AND RECLAMATION BRANCH

REPORT OF THE DIRECTOR AND CHIEF ENGINEER OF WATER-POWER, J. B. CHALLIES, C.E., M.E.I.C.

ORGANIZATION AND SCOPE

The past fiscal year was noteworthy by reason of the amalgamation effected of the Dominion Water Power Branch and the Reclamation Service. This amalgamation proceeded gradually without any, even temporary, dislocation of the work of either branch. In view of the varied administrative responsibilities of the combined services it will be more convenient to outline their organization under the main divisions of activity, namely: Water-Power, Irrigation, and Drainage.

Water-Power

The Water-Power activities are both administrative and investigatory. The administrative phase of the work arises from the proprietary interest of the Dominion in the water resources in the provinces of Alberta, Saskatchewan, and Manitoba, the Northwest and Yukon Territories, and in the Railway Belt of British Columbia. In this connection the department must of necessity secure such fundamental engineering and economic data as will enable it to consider applications for power privileges, and to control the development, the distribution and the sale of hydro-electric energy. This is the prime responsibility of the branch.

Throughout the remainder of the Dominion the water-powers are vested in the provinces and investigatory work is carried on in co-operation with the respective provincial authorities charged with their administration. The branch also co-operates extensively with federal departments and commissions other than the Department of the Interior, the services of its engineering field staff in the interests of general economy and efficiency, being made available to such other departments and commissions.

The co-operative facilities for water resources investigation work throughout the Dominion are as follows:—

British Columbia.—The local organization, with headquarters at 119 Pender street west, Vancouver, carries on a broadly planned hydrometric survey and systematically secures fundamental data necessary to a complete analysis of the water-power resources, in accordance with the terms of a co-operative agreement with the Provincial Water Rights Branch of British Columbia.

Alberta and Saskatchewan.—The local organization, with headquarters at 513 Eighth avenue west, Calgary, carries on direct administrative work throughout all parts of the two provinces, in virtue of the proprietary interest of the department in their water-power resources. The investigatory work comprises a comprehensive hydrometric survey and a systematic and exhaustive field and office analysis of the water-power resources of the two provinces. With the

amalgamation of the Dominion Water Power Branch and Reclamation Service, the Commissioner of Irrigation, as ranking officer in Calgary, has been placed in administrative control of the combined organizations.

Manitoba.—The local organization, with headquarters at 231 Chambers of Commerce Block, Winnipeg, carries on direct administrative work throughout the province, in virtue of the proprietary interest of the department in the provincial water-power resources. A comprehensive hydrometric survey is maintained, as well as a systematic and exhaustive field and office analysis of the provincial water-power resources. In the interests of administrative economy the investigatory work carried on through the Manitoba office has been extended to cover that portion of Ontario lying west of and including lake Nipigon.

Ontario.—The local organization, with headquarters at Ottawa, carries on a comprehensive hydrometric survey and systematically secures fundamental water resources data in accordance with the terms of a co-operative agreement with the Ontario authorities. The closest co-operation is maintained with the staff of the Ontario Hydro-Electric Power Commission.

Quebec.—The local organization, recently established with headquarters at 201 Inspector street, Montreal, is developing a comprehensive hydrometric survey and has commenced the systematic collection of fundamental water resources data as required by the terms of the co-operative agreement with the Quebec authorities. The closest co-operation is being maintained with the staff of the Quebec Streams Commission.

The Maritime Provinces.—The local organization, with headquarters at 193 Hollis street, Halifax, in accordance with the terms of a co-operative agreement with the three respective provincial authorities of New Brunswick, Nova Scotia, and Prince Edward Island, carries on a systematic hydrometric survey and a comprehensive and continuous power and storage survey of the three provinces, with a view to securing the fundamental data necessary to a complete analysis of their water-power resources. In New Brunswick, the branch collaborates with the New Brunswick Electric Power Commission; in Nova Scotia with the Nova Scotia Power Commission; and in Prince Edward Island with the provincial authorities.

Yukon and Northwest Territories.—Administrative and investigatory work in the Territories forms a direct responsibility of the Water-Power organization in virtue of the proprietary interest of the department in their water-power resources. Investigatory work in the Yukon is handled through the British Columbia organization. In the remainder of the Territories such work is directed from head office, as exigencies demand.

The water-power field organization is based upon and built up around the Dominion Hydrometric Survey staff through which systematic and continuous stream measurement studies are carried on throughout the Dominion. The data systematically accumulated through this work and through co-operative agreements and studies with other organizations is collated, analysed, and standardized in the head office of the branch at Ottawa.

As a result, there is now on file in the Ottawa office general and detailed information in respect to run-off and power possibilities of the more important power rivers throughout the Dominion. These data are constantly being brought up to date as new or later information is received and is promptly available for reference purposes to all interested in the utilization of the water-powers of the Dominion.

Irrigation

The irrigation activities are based upon the administration of the Federal Irrigation Act of 1894. Under the provisions of this Act the ownership of all surplus water supply in the provinces of Alberta, Saskatchewan, and northern Manitoba is vested in the Crown and the Act provides means for granting rights to use the available water for domestic, municipal, industrial, and other purposes. All licenses for the use of water are conditional upon continuous beneficial use and may be cancelled for abandonment or waste.

The local organization, in charge of the Commissioner of Irrigation, with headquarters at 513 Eighth avenue, west, Calgary, is responsible for the field administration. This work consists in making preliminary surveys throughout the semi-arid districts in sufficient detail to determine the feasibility of irrigation projects, to approve the plans for the construction of works which must accompany the applications for a water license, to investigate the water supply, and keep a record of the amounts of water granted in order to insure that there is sufficient water available to meet the needs of the applicant.

The water supply in Alberta and Saskatchewan is sufficient to irrigate only a small percentage of the lands which might be benefited, and another activity of this branch is to determine the "duty of water" in accordance with varied localities and soils in order that the available supply may be used to the best advantage in the interest of the greatest number. This necessitates a series of careful experiments extending over a period of years to determine the depth of water, time, and method of application required to produce maximum yields of the various crops which are grown under irrigation.

Drainage

The Federal Drainage Regulations, established by Order in Council by virtue of the Reclamation Act and the Dominion Lands Act, vest in the Minister of the Interior the right to drain and sell Dominion land or to grant the right to individuals or to the provincial drainage departments to drain bodies of water in the provinces of Alberta and Saskatchewan, and Dominion land thereby reclaimed may be sold by the Department under the provisions of the said Drainage Regulations.

The administration of the Reclamation Act and Drainage Regulations is conducted by this branch with headquarters at Ottawa. Field investigations, inspections, and surveys in connection with drainage in the provinces of Alberta and Saskatchewan are carried out by the field staff of the Commissioner of Irrigation, Calgary, on instructions issued from Ottawa. In the provinces of Manitoba and British Columbia questions of drainage in which this department may be interested are dealt with through the offices of the District Chief Engineers of this branch. The closest co-operation is maintained with the provincial drainage departments at all times.

Water-Power

LAKE OF THE WOODS CONTROL BOARD

The Lake of the Woods Control Board was, as in previous years, responsible for the regulation of the level and outflow of lake of the Woods.

As heretofore regulation of lake of the Woods embraced continuous collection of hydrological data relating to the watershed. In this connection the board was indebted to the Department of Public Works for run-off records pertaining to Rainy and Namakan lakes. Unusually high snowfall during the winter necessitated the full opening of the Norman dam in April but with low

precipitation immediately preceding and following break-up it was found possible to close the Norman dam the same month. Owing to abnormally low precipitation during the remainder of the year lake level dropped from an elevation of 1,060·4 feet on July 17, to an elevation of 1,057·6 feet on March 31.

Detailed field and office investigations of the most feasible and economical method of providing an increased out-flow capacity from lake of the Woods were completed during the year. The board, in its final report, made recommendations as to the enlargement of the western outlet of the lake and the provision for a suitable control structure, together with estimates of the cost thereof.

An investigation was made of the storage potentialities of the boundary waters tributary to Rainy lake. In addition, continuous records of lake level and overflow of lac Seul were secured throughout the year, together with information relative to the power resources of the English river.

WATER POWER REGULATIONS AND LEGAL RESEARCH

The present Dominion Water Power Regulations under which water-powers situated on lands of the Dominion are leased for development purposes, are dated October 31, 1921, and have not since been changed. Four priority permits, which give applicants for power privileges a certain degree of priority in the consideration of their development plans over other possible applicants, are at present in force under these regulations. They deal with a power site on the Nelson river, one on the Winnipeg river, and two on the Grass river in north-eastern Manitoba.

Two power companies which acquired their preliminary rights under the former regulations have applied for final licenses under the new regulations, modified in accordance with their existing rights, and these are now being prepared.

The systematic study of the laws passed by the various legislative bodies in Canada since their inception dealing with the uses of water, more especially for power purposes, which was referred to in the last annual report, has been continued during the year. This survey of the legal principles and administrative procedure which form the basis of water-power development throughout Canada is substantially completed as regards British Columbia, the Prairie Provinces, Nova Scotia, New Brunswick, and Prince Edward Island, and some progress has been made with Ontario and Quebec.

As regards the study of foreign water-power legislation and administration which has been in progress for some years, the record of acts and regulations relating to Switzerland, Spain, and Portugal was brought up to date, also those at present available relating to Russia and Japan.

BRITISH COLUMBIA ADMINISTRATION

In the Railway Belt in British Columbia the waters and water-powers, although they form part of the public property of the Dominion, are administered by the provincial authorities (except within the Canadian National parks) under the provincial Water Acts; and the Dominion lands within the Railway Belt are administered by the Department of the Interior, the two systems of administration working together in a very satisfactory manner. The responsible officers of this department are enabled to exercise a proper degree of supervision over Dominion interests in the waters and in the other natural resources affected by their use, and at the same time a uniform method of acquiring water rights for all purposes has been established throughout the province.

The Burrard Power Company has been authorized by the province to develop power on Stave lake and river by erecting a dam at the foot of Alouette lake and diverting the waters of that lake into the Stave lake watershed, by means of a tunnel. This will necessarily affect the natural flow of the Alouette river and consequently its use for floating purposes by the licensees of the Crown timber berths surrounding Alouette lake.

In order to protect the interests of these licensees, this department stipulated that proper provision should be made for passing logs over the dam and for releasing a reasonable flow of water when necessary. The plans of the dam as approved by the Comptroller of Water Rights are satisfactory to the department in that respect, and have been accepted by the timber licensees.

The examination of water records issued by the province appurtenant to lands within the Railway Belt has been continued, and the granting of necessary rights of use or occupation of Dominion lands under the Water Lands Regulations is proceeding satisfactorily in co-operation with the Forestry and B.C. Lands branches of this department.

A large amount of work was done in the Railway Belt by the branch engineers on behalf of the Department of Indian Affairs during the past year. Reports were prepared dealing with systems of water supply for the Indian reserves for irrigation, domestic, and other purposes, and works of this nature authorized by the Indian Department were carried out under the supervision of the branch engineers.

The following are the more important investigations made and works constructed or begun within the year: water supply systems to serve Indian reserves at Metlakatla, Church House, Sechelt, Fraser Lake, and near Chilliwack; irrigation systems for the North Thompson and Stone Indian reserves; sewage disposal plants for Indian schools at Sardis and Kamloops; and an electric lighting system at Cape Mudge.

In addition to this engineering work, a large amount of material was collected in support of the Indian claims for water rights appurtenant to their reserves, and presented to the Board of Investigation, at hearings under the Water Act. Plans and other information called for by Board Orders were also prepared and efforts made to expedite the issue of the water licenses which have been granted in response to the Indian claims.

WATER RESOURCES INDEX INVENTORY

The Index Inventory system devised by the branch and applied to the recording and collating of the water resources data of the Dominion, has now been in actual use for a number of years. A comprehensive description of this system has been given in a previous annual report.

The application of the system has been found most advantageous in practically every phase of the activities carried on by the organization, particularly in the complete census of developed water-power, the analysis of central electric station activities, and the analysis of undeveloped water-power resources, stream measurement activities, and storage studies.

As a result of this work having been largely carried on in co-operation with provincial organizations, notably the Hydro-Electric Power Commission of Ontario, the Quebec Streams Commission, the Water Rights Branch of British Columbia, the New Brunswick Electric Power Commission, and the Nova Scotia Power Commission, there has been compiled a very large amount of water resources data in standardized and usable form for whatever purpose required. A sustained effort is made to keep this information authentic and up-to-date.

83305—12—8½

WATER-POWER RESOURCES OF CANADA

The recorded water-power available throughout the Dominion under conditions of ordinary minimum flow is 18,255,000 horse-power, while that ordinarily available for at least six months of the year is 32,076,000 horse-power.

There are installed to date throughout the Dominion water-wheels and turbines to the extent of 3,227,414 horse-power. This installation represents an investment of over $687,000,000 and a coal economy of 29,000,000 tons annually which, at $10 per ton, would cost $290,000,000, a large portion of which sum would be required to pay for coal importations.

Present practice in Canada indicates that it is commercially feasible to install turbines to an extent 30 per cent greater than the corresponding estimate of power available for six months of the year. This being the case, the present recorded water-power resources of the Dominion would permit a turbine installation of 41,700,000 horse-power, and on this basis the present installation is approximately 8 per cent of that ultimately possible.

The 3,227,414 horse-power at present installed may be classified as follows:—

2,411,701 horse-power in central stations for general distribution for all purposes.

497,620 horse-power installed in pulp and paper mills, not including 228,755 horse-power purchased from central stations for use in pulp and paper mills.

318,093 horse-power installed in industries other than central stations and pulp and paper mills.

The total installation for the Dominion averages 353 horse-power per thousand of population, which figure places Canada high amongst the countries of the world in the per capita utilization of water-power.

During 1923 the turbine installation in Canada increased by practically 255,000 horse-power, but what is even more significant is the number of new projects actually in progress of construction or actively in prospect, which will raise the installation by the close of 1925 to 4,000,000 horse-power.

CENSUS OF THE CENTRAL ELECTRIC STATION INDUSTRY

As over 97 per cent of the electrical energy generated by the central electric stations of Canada is produced by the development of our widely distributed and advantageously situated water-powers, the gathering and analysis of accurate statistics of the industry becomes a matter of prime importance.

Under the terms of a co-operative agreement between the Dominion Water Power Branch and the Dominion Bureau of Statistics and as a part of the Census of Industry conducted by the bureau, an annual census of the central electric station industry is taken. The sixth annual census was completed during the past year and a general statistical digest of the industry as at 1st January, 1923, together with the necessary explanatory text, was published by the Dominion Bureau of Statistics. A Directory of the Central Stations, as was noted in the last annual report, was published last year. There has been a brisk demand for this directory, which is the second published, and it is proposed to issue revised editions from time to time as the older edition becomes exhausted and as changes in the industry warrant.

DOMINION HYDROMETRIC SURVEY

The Dominion Hydrometric Survey embraces all the provinces of Canada. In the Prairie Provinces the work is a direct responsibility of the Federal Government and in the other provinces it is now carried on under co-operative

agreements. With this consolidation of the hydrometric survey, it has been possible to rearrange both field activities and office administration and to standardize the methods. This has resulted in an over-all saving in administration and a natural gain in efficiency, together with the valuable factor of making available to the public water resources information at one central source. The arbitrary divisions of provincial boundaries have been eliminated and the logical and natural divisions of major drainage basins have been instituted. The main drainage basins into which the country has been divided together with the location of the district office or offices in charge are as follows: Pacific drainage, Vancouver; Arctic and Western Hudson Bay drainage, Calgary and Winnipeg; St. Lawrence and Southern Hudson Bay drainage, Ottawa and Montreal; Atlantic drainage, Halifax.

A most pressing demand for detailed and extensive records of the regimen of the various lakes and rivers of the country has been brought about by the increasing utilization of water resources for diversified and often conflicting purposes and particularly in connection with power development and irrigation projects. No greater recognition could be given to the importance of stream-flow records than in the material voluntary co-operation afforded the survey by numerous individuals and private corporations.

Run-off Conditions in Canada.—As shown in detail in the reports of the district chief engineers the average run-off for the year has been below normal in British Columbia, slightly above normal in Alberta, normal in Saskatchewan, slightly above normal in Manitoba and Ontario and normal in Quebec and the Maritime Provinces. The distribution of run-off throughout the year was, however, at variance with average conditions; in certain parts of the country flood inflow exceeded the average while run-off during the autumn was deficient.

In the Pacific drainage, stations typical of general run-off conditions indicated a run-off of 91 per cent of the average. Except on Seymour creek where the flood was 295 per cent of the average and the deficiency 22 per cent of the average, no abnormal run-off conditions were recorded.

With the exception of the Assiniboine River basin, run-off, in the Arctic and Western Hudson Bay drainage, ranged from 50 per cent to 135 per cent of normal. The run-off in the streams rising in the eastern slope of the Rocky mountains was above normal with the exception of the Peace river, which had only 97 per cent of the average. In the Oldman tributary basin all the streams reached stages in excess of any previously recorded, as did also the Highwood and Elbow rivers. The prairie streams in the northern part of the three provinces were all below normal, as was the Red river in southeastern Manitoba. In the Assiniboine basin excessive spring floods were again recorded and the average for the year was 240 per cent of the mean of previous years. The run-off for Moosejaw creek was 8,500 per cent of the mean in the month of July.

In the St. Lawrence and Southern Hudson Bay drainage, the run-off of typical stations, ranges from 80 per cent to 115 per cent of the mean.

In the Atlantic drainage, comprising the Maritime Provinces, run-off conditions were exceptional. Typical stations show flood run-off ranging from 200 per cent to 265 per cent and low water run-off as low as 20 per cent of the mean. The average run-off for the year was about normal.

POWER AND STORAGE INVESTIGATIONS

During the year the dictates of economy again necessitated the most careful apportionment of field expenditures and only the most urgent power and storage investigations were undertaken. Office studies of the developed and un-

developed water-power resources of the Dominion were, however, prosecuted with vigour, close co-operation being maintained with the provincial authorities of British Columbia, Ontario, Quebec, and the Maritime Provinces.

In British Columbia special investigations were continued in co-operation with the city of Vancouver in connection with the possibilities for hydro-electric development within a radius of 100 miles of that city. In co-operation with the Provincial Water Rights Branch the analysis of the water-power resources of the province was actively carried on.

In Alberta an application for power privileges on the Crowsnest river necessitated a field inspection of the site and power market from which a report was prepared. Studies were made of power possibilities and flood prevention on the Elbow river.

A survey was made of a small power site on a branch of Lee creek for which an application had been received. Responsibility for the operation of the Lake Minnewanka storage during the filling season was again assumed by the department with very satisfactory results to all concerned.

In Manitoba field observations were made of the excessive floods on the Assiniboine river during the months of April and May also studies of the causes and effects of these floods. The analysis of the water-power resources of the Prairie Provinces was actively carried forward.

In Ontario at the request of the Lake of the Woods Control Board a reconnaissance survey was made of the power and storage possibilities of the International Boundary waters above Rainy lake. The analysis of the water-power possibilities of the province was continued in co-operation with the provincial authorities.

In Quebec the exchange of water resources data with the provincial authorities was continued and the analysis of the developed and undeveloped powers of the province actively carried on.

In New Brunswick, in co-operation with the New Brunswick Electric Power Commission, a survey was made at Grand falls on the St. John river to determine the flowage and pondage that will result from the proposed power dam. An investigation was made of the power possibilities of Goldsmith brook near St. Stephen. As a result of the extraordinary flood of May 1, special investigations were made on a number of streams, particular attention being paid to the St. Croix river.

In Nova Scotia surveys were made and reports prepared of the power possibilities of the St. Croix river, Wallace river, Salmon river, East River Chester, and West River Antigonish. Considerable attention was also given to problems arising from other projects of the Nova Scotia Power Commission, notably the developments on East River Sheet Harbour.

FLOODED LAND CONTOURS

The establishment of boundaries of overflowed lands and lands required for flooding as they affect the administration of water-power was carried on throughout the year.

The principal work carried out under this section during the season of 1923 was the survey of Alouette lake in the province of British Columbia. The proposal by the Burrard Power Company to construct a dam at the present outlet of Alouette lake and raise the water from elevation 438 to elevation 485 for the purpose of developing power by diversion of the water through a tunnel to Stave lake will flood a considerable area of Dominion lands. The survey was made for the purpose of locating and describing this area and involved a traverse of the 441-foot contour, representing ordinary high water mark of the 490-foot contour, representing the upper limit of the area required for flooding, and the subdivision of the area comprised within these lines.

The subdivision was commenced at the northeast corner of section 4 in township 4, range 4, west of the 7th meridian, from which point the lines were projected north and east and closed on Bluff point triangulation station on Stave lake. This survey comprised portions of township 4, range 4, west of 7th meridian; township 4, range 3, west of 7th meridian, and township 5, range 3, west of the 7th meridian, and was sufficiently extended to include the location of the dam site in section 9, township 4, range 4, west of the 7th meridian, tunnel site in sections 10 and 11, township 5, range 3, west of the 7th meridian, and the power-house site in section 11, township 5, range 3, west of the 7th meridian.

All traverse lines were run with a transit and chain, and elevations determined by means of the dumpy level. The contours were located by right-angled offsets from the traverse lines. Elevations are referred to the Ruskin datum of the British Columbia Electric Railway Company.

The total length of section line surveyed amounted to 32·5 miles and of traverse lines 53·5 miles.

In addition to the above the survey that was commenced at the Lower Seven Sisters site on the Winnipeg river in 1922 was completed between the north boundary of sections 4 and 5 in township 14, range 11, E.P.M., and the east boundary of sections 27 and 34 in township 13, range 11, E.P.M.

A survey was also made of the land required for flooding on the NE. $\frac{1}{4}$ of section 34, township 15, range 11, E.P.M., in order that the remainder of the quarter-section might be released for sale.

Irrigation

The Irrigation Division is responsible for the administration of surface water supply (with the exception of water-powers) throughout practically the whole of the Prairie Provinces. This work is carried out under the provisions of the Irrigation Act and includes the use of water for domestic, municipal, industrial, irrigation, and other purposes. Obtaining the information necessary for allotting the water supply so that the greatest benefit may result to the public involves making the necessary surveys, stream measurements, studies of water supply, soil and climatic conditions, experiments in use of water and proper methods of irrigation, and many other phases of engineering work. To insure that the water granted is put to beneficial use and not wasted or misused requires periodical inspections of small schemes, supervision of large projects, demonstration and instructional work, and investigation into problems of seepage, drainage, etc.

Climatic and Crop Conditions in Southern Alberta.—With the exception of December, the winter of 1922-23 was mild. Very little snow lay on the ground and with some feeding during the colder weather range stock wintered well. Spring rains came early, and by April 15 agricultural operations were general. May and June were warm months with heavy rains and in July there was well distributed and exceptionally heavy rainfall. The precipitation during the growing season was the heaviest in years and resulted in good or fair crops in almost every section of the country.

Because of the unusual rainfall, irrigation was not so generally practised. In those cases where farmers did supplement the natural moisture with irrigation they were well repaid by increased yields.

Progress in Irrigation Development.—Four irrigation districts, the Lethbridge Northern, United, Little Bow, and New West, completed construction during 1923 in time to divert some water and to prime their canal systems. The Mountain View district started construction work and should complete its project in 1924 without difficulty. Plans for bringing new settlers into these

areas, particularly the Lethbridge Northern district, were carried on vigorously and there is every indication of their being successful. The splitting up and colonizing of the larger farms, to make intensive farming possible, is now the greatest problem of the irrigated areas.

The construction and operation of small private irrigation schemes, where lands may be watered by diversion from nearby streams, showed less progress than usual because of the "wet" year. The Irrigation Division now has under its supervision about 620 licensed or authorized schemes and some 200 schemes not yet authorized.

No large survey work was undertaken in 1923, with the exception of reservoir reconnaissance work along the foot-hills in central Alberta, and a survey of the Frenchman River valley in connection with the International Waterways Treaty. The unprecedented floods in the vicinity of High River in June 1923 made necessary a topographic survey of the Highwood River flats in connection with stream protection.

WATER ADMINISTRATION

This work is carried on to ensure that rights are not granted to more water than is likely to be available from any source of supply and to define water rights in such a manner that future claims may be adjusted without friction.

This requires a knowledge of the flow of streams at all times and under all conditions, and to obtain such information much detailed field work and elaborate office study is necessary.

Nearly the whole of the available supply has now been appropriated on some streams and in such cases careful experiment and study is necessary before further rights can be granted.

INSPECTION WORK

This work is carried on by five inspecting engineers who deal with applications for water for domestic, municipal, and industrial purposes, and for small irrigation schemes. A slight falling off in the number of applications recorded during the fiscal year is noticeable, but this did not reduce to any appreciable extent the duties of the inspecting engineers. It has been observed that the rate at which new applications are recorded bears a close relationship to the amount of precipitation and varies conversely with it. Indications at present are that new work this coming year will again be below normal in view of which it will be possible for the engineers to devote more time to the inspection of licensed schemes. This is desirable to stimulate interest by suggesting improvements in the layout and operation of irrigation schemes.

For the convenience of the inspecting engineers district offices were maintained at Edmonton, Lethbridge, Medicine Hat, and Macleod. These offices facilitate the preparation of plans, reports, etc., and afford an opportunity for interested persons to get in touch with the engineers.

Water Supplies for Domestic, Industrial, and Other Purposes.—A considerable number of applications for domestic water rights were received. The majority of these domestic applications are on intermittent sources of supply, with water only available in the spring, and storage is therefore the predominating element in the design and construction of the necessary works. All assistance possible is rendered to applicants for water rights of this nature, particularly in regard to the filing of applications, the making of surveys, and preparation of plans. Wherever possible and consistent with the regulations the necessity for publication of notices is waived. In these conditions the applicant obtains the benefits of a water right at a very nominal figure.

The collection of municipal water supply data has been continued throughout the past year and the department is again indebted to the various cities and towns for the co-operation which has made this work possible. The records have been compiled in a manner similar to previous years and will be published in the separate report of this branch.

Owing to the conflicting interests of those engaged in ice-cutting operations and to the fact that, in certain districts, water surfaces are limited in area and consequently their location is of a strategic value, the department has found it necessary to issue ice-cutting regulations and to inspect and apportion areas to the various applicants. This work is, of course, carried out after completion of the regular field season and inspection work. During the past winter a number of inspections were made, disputes as to areas investigated and settled. and permits issued.

The Cypress Hills District.—This district is divided into two parts, east and west, each being in charge of an inspecting engineer. Practically all schemes in the eastern portion have been completed and licensed, and have been operated for several years with varying degrees of success.

In the western portion of the district less than normal snowfall during the winter resulted in a shortage of water on many streams during the early part of the season. This condition necessitated a number of investigations and the adjustment of certain priority rights. Because of the dry spring and very wet summer months, fall and early spring sown grains were a total loss, although late sown grains yielded good returns. It is very noticeable that the older irrigation schemes in this area have netted their owners profitable returns even during the driest years.

Cardston District.—An office was secured at Macleod for the use of the engineer in charge of this district and this proved a great convenience, enabling the office work to be kept up-to-date and giving the farmers of the district an opportunity to obtain advice regarding their schemes. Due to the heavy rains in June and July high floods were general throughout the foot-hills causing some damage to headgates and ditches. Fairly good progress has been made with construction work on the many small private schemes and the fine crops harvested after a number of poor ones have given both farmers and ranchers a much brighter outlook.

Special Inspections, Alberta.—As in previous years inspection work was carried on practically throughout the entire year, a number of inspections for ice permits being undertaken during the winter months. The rainfall was sufficient to produce good crops throughout the district generally, the only exception being the southern portion of the Berry Creek district.

Special Inspections, Saskatchewan.—A slight decrease in the number of applications received in this district was noticeable, particularly as regards industrial, domestic, and municipal applications. Irrigation applications, however, increased to a small extent. As in Alberta on account of the fairly abundant rainfall, farmers generally felt there was no particular urge for irrigation, but those who applied an additional few inches of water at the right time greatly increased their crop yields.

THE CANADIAN PACIFIC RAILWAY COMPANY'S IRRIGATION PROJECTS

Western Section.—This project has now been in operation some sixteen years; it has a total classified irrigable area of 218,980 acres. The past season has been ideal for crop production and after six comparatively dry years it can reasonably be classed as a wet season. The rains came at the most opportune

times for maximum crop production. This fact is made particularly evident from the report of the company's grain survey which gives an estimate of 10,050,000 bushels of wheat from the total area cultivated, equal to an average per acre yield of 35 bushels. Owing to the particularly favourable moisture conditions only 3,074 acres were irrigated and this mostly for alfalfa and meadow grasses. Many of the wheat crops on summer-fallow produced from 40 to 60 bushels and oats under similar conditions went as high as 130 bushels per acre. During the growing season, i.e., from April 1 to August 31, 14·83 inches of rainfall was recorded at Strathmore and the frost-free period extended for 130 days.

An extensive programme of maintenance work was carried out during the season, some 250 miles of ditches being cleaned out and reshaped. Extensive repairs were also undertaken on various portions of the system.

Eastern Section.—This project has now been in operation for ten years and has a total irrigable area of some 400,000 acres of which about 124,000 acres have been sold. With a much lower precipitation and with slightly higher average temperatures than the Western Section, irrigation is essential for profitable farming. The area actually irrigated during the past season was 42,928 acres, as compared with 93,375 acres in 1922, a decrease of 50,447 acres. This decrease was entirely due to the unusually heavy rainfall which led many farmers to trust to natural conditions instead of irrigating. The farmers in this section have not yet fully realized how much water their crops require to produce maximum returns. A record of the results on ten typical farms as compared with the Brooks Experimental Station shows the value of irrigating very clearly. On these ten farms the average yield of wheat was 19½ bushels per acre with only one irrigation, which corresponds very closely with yields obtained at the Experimental Station under similar soil and climatic conditions with one four-inch irrigation. But with two four-inch irrigations the yields received were from 30 to 35 bushels, and with three four-inch irrigations they were as high as 43 bushels per acre.

Lethbridge Section.—The area under water agreement in this section is 77,162 acres and a large percentage of the land lying below the canals is under cultivation. The total area irrigated during the season was 72,345 acres, as compared with 75,558 acres in 1922. The average per acre value of the crops raised on the irrigated lands was $18.81, and the average value of crops on non-irrigated lands was $16.30. The total value of the various crops grown on the irrigated lands during the season has been estimated at $1,026,925 and at $277,709 from the non-irrigated lands. There were 937 actual users of water during the season.

The ground was very dry in the early spring, but an unusual quantity of rain fell in June and July and in consequence there was very little call for irrigation. The rainfall at Lethbridge during the irrigation season was 12.76 inches, the total for the year being 16.40 inches. The period free from damaging frosts extended from May 3 to September 22, equal to 143 days.

Very little new construction has been carried out during the year, but improvements were made to a number of existing structures and many miles of canals and ditches were cleaned out and strengthened.

TABER IRRIGATION DISTRICT

This has been the third year of farming under irrigation conditions for this district. Owing to the generous rainfall during the growing season only 3,625 acres of the 17,244 irrigable acres in the district were actually irrigated.

The financial condition of this district remains satisfactory. Surplus funds now amount to $29,507.82, an increase of $7,933.48 over the previous year. The Board of Trustees considered the purchase of some of the district bonds with this surplus, and the bondholder, the Canadian Pacific Railway Company, agreed to release them at par. Eventually, however, it was decided to defer utilizing this surplus until 1925, it being felt that a reduction of fifty cents in the 1924 assessment, which would absorb some $8,000 of the surplus, would be more helpful to the farmers at this time.

CANADA LAND AND IRRIGATION COMPANY

This has again been a good year for the farmers under this project, the crops harvested being above the average. Weather conditions were particularly favourable, the precipitation during the growing season being well distributed. The records of rainfall at Vauxhall showed a total for the period of 12·31 inches. The frost-free period extended from May 28 to September 10, or 105 days, as compared with 136 days in 1922. The climatic conditions throughout the whole district were particularly favourable, there being very little wind and sufficient rainfall to raise a good crop on dry land. On the irrigated lands there were 10,373 acres cropped, of which 6,815 acres were irrigated. Of the total cropped area, 4,965 acres were seeded to wheat and yielded an average of 26·35 bushels per acre, equal to a per acre value of $18.44. The second largest acreage was alfalfa hay with 1,463 acres yielding 4,390 tons on an average of 3 tons per acre, which, at $8 per ton, represented a per acre return of $24. The total estimated value of the crops grown on the 9,647 acres which were recorded was $196.916.25 which represents an average per acre yield of $20.41.

NEW WEST IRRIGATION DISTRICT

This district consists of 4,500 acres of irrigable land in township 14, range 16, west of the 4th meridian. The water supply is obtained from the Bow river and is diverted through the works of the Canada Land and Irrigation Company.

The necessary formalities with regard to organization, etc., were completed early in 1923 and construction of the system to distribute water from the Canada Land and Irrigation Company's main canal throughout the district was commenced at once and completed with all necessary structures by August. The total cost per acre was $46.55, which amount was raised by the sale of district bonds. A small amount of water was diverted during the fall, but very little land was actually irrigated, good crops being harvested as a result of the favourable rainfall. The yields would have been increased by additional moisture but the farmers had not opportunity or time to level and prepare their lands for irrigation.

LETHBRIDGE NORTHERN IRRIGATION DISTRICT

Construction work on this project was completed about the end of May, 1923, and the official opening was announced to take place at Keho Lake reservoir on Saturday, June 16. Unfortunately an unprecedented flood in the Oldman river on June 1 and 2 caused such serious damage to the headworks, the first one and one-half miles of the main canal, and the flume across the Oldman river that the opening ceremony was indefinitely postponed. The damage thus created was not repaired until September 30. Water was again turned into the system on October 3 and authority was given to divert until October 15. Owing to an exceptionally open fall and the urgent requests of the farmers for water for fall irrigation and stock-watering ponds, the system was operated until October 29. The total cost of repairs necessary to restore

the works and render them safe for operation was $81,500. The total amount expended on construction to December 31, 1923, was $4,097,614. The number of acres irrigable in the district is 104,856. The average cost per irrigable acre, construction only, approximates $40. The area actually irrigated during the past season was 6,963 acres.

An active land settlement campaign is being conducted by the Irrigation Council of Alberta with a view to assisting the farmers to dispose of their surplus irrigated lands. Agents have been sent to Europe and good progress is being reported.

UNITED IRRIGATION DISTRICT

Construction work on this project, which lies twenty miles south of the town of Macleod, was completed during the early part of August, 1923, and a final inspection of the works made during the same month. Water was turned into the system on July 17 for the purpose of priming canals and puddling structures. Some 3,000 acres of stubble and summer-fallowed land were fall irrigated.

An additional area of 2,163 irrigable acres was added to the north end of the district during the year, and this, with a careful reclassification survey of all lands, has resulted in increasing the total irrigable area to 36,158 acres. The district bond issue was $550.000, of which $417,184 was expended, and the yearly financial statement shows a very satisfactory condition with a considerable bank balance.

SOUTH MACLEOD IRRIGATION DISTRICT

Further progress in connection with the construction and development of this project is being held in abeyance by the provincial authorities until the surplus irrigated lands in districts already constructed have been settled upon.

LITTLE BOW IRRIGATION DISTRICT

This consists of some thirty farms scattered for a number of miles along both banks of the Little Bow river. The district diverts water from Highwood river into the Little Bow—which has not sufficient natural flow—by means of community headworks and a canal, for rediversion to the individual farms by pumping plants to be installed by the different landowners.

Construction of the headworks and necessary river protection work in connection with this project was undertaken during the winter of 1922-23. The excavation of the section of canal to connect with the channel of the Little Bow river was built during the spring and summer. Water was first turned into the system from the Highwood river on the 6th September.

The license for 50 cubic feet per second from the Highwood river, originally granted to the Government of the province of Alberta for the domestic and stock-watering requirements of the settlers along the Little Bow river, will now, by arrangement with the district, be diverted through these works.

Although the diversion works of this project are complete and water can be diverted into the Little Bow river, none of the individual irrigation schemes have been constructed. The past season was the first for several years that the farmers of this new district received sufficient rainfall to ensure a crop. Their whole efforts were, therefore, centred upon making the most of these favourable conditions and they naturally decided to suspend any work entailing further financial outlay until after their harvest had been assured. It is fully anticipated that the majority of these individual pumping schemes will be installed before the coming summer.

MEDICINE HAT EASTERN IRRIGATION DISTRICT

It was pointed out in last year's report on this project that the Provincial Government had declined to pledge the credit of the province for the security of the district's bonds on the ground that the district members themselves should be able to finance the comparatively low cost. The district officials found it impossible to do this and in July, 1923, after inspecting some of the lands affected, the Minister of Railways and Telephones expressed his willingness to present to the Government of the province a request for a guarantee of debentures for the Bullshead Creek section of the project.

This section consists of 1,600 irrigable acres on the south boundary of Medicine Hat. It is not probable that any action will be taken towards the development of the Ross Creek portion of this project until the results of the experiment on the Bullshead Creek section have been studied.

MEDICINE HAT SOUTHERN IRRIGATION DISTRICT

Some further surveys and studies regarding the reservoir possibilities in the Sevenpersons drainage basin were made during the early part of the year. From the information collected a scheme was evolved to create storage in Robinson valley to irrigate 3,000 acres of land. It was found, however, that some 2,600 acres of productive land would be flooded or otherwise rendered valueless by the reservoir, so the project was not considered feasible, and the application of the district for water was cancelled. As nine subsequent applications have been received from private individuals to develop small irrigation schemes from the available waters of this drainage basin, it would appear that the water will be put to beneficial use in the near future by the owners of riparian lands.

ROBSART-VIDORA IRRIGATION DISTRICT

This project lies south of the town of Maple Creek and contains some 10,000 acres to be irrigated from a reservoir in the Frenchman River valley. Full reports, estimates, and plans of the project, as prepared by the Reclamation Service, were furnished the district in 1922, and since then the interested persons have been arranging with the Provincial Government for their organization under the Irrigation Districts Act. This was finally promulgated in the Saskatchewan Gazette under date of December 5, 1923.

LETHBRIDGE SOUTHEASTERN PROJECT

As its name implies, this project comprises land south and east of the city of Lethbridge. It is proposed to divert water from the Waterton, Belly, St. Mary, and Milk rivers and by means of storage reservoirs at various points to regulate and conserve the available water supply. Surveys made by the Reclamation Service show that it is feasible to irrigate some 414,000 acres at an estimated cost per acre of $40.11. Full reports of this project with maps and estimates of cost were published in the separate reports of the Reclamation Service in the years 1921-22 and 1922-23.

An investigation was made during the past year of the possibilities of storing in the Milk river in township 2, range 18, west of the 4th meridian, Canada's share of the flow of that stream. This was suggested by Mr. D. W. Hays, consulting engineer for the project. A plane-table survey was made and a reservoir at this point found to be feasible. From a study of the water supply it has been determined that a capacity of 30,000 acre-feet would be the most economical development and the dam design and cost estimates have been based on this.

It is proposed to incorporate this reservoir in the development of a project to irrigate some 17,000 acres of land in the Warner district of the Lethbridge South Eastern project.

MOUNTAIN VIEW IRRIGATION DISTRICT

This district, lying in townships 2 and 3, ranges 27 and 28, west of the 4th meridian, comprises some 2,500 acres which can be irrigated from the Belly river at a cost of about $13.50 per acre. At the request of the landowners surveys were made and the project designed by Reclamation Service engineers. Upon the plans and estimates being turned over to the landowners, steps were taken to have the area organized into a district and this was accomplished on August 15, 1923. Construction was commenced a little later and should be completed without difficulty in 1924. In this case the farmers are undertaking the financing and most of the construction work.

PROPOSED MAGRATH IRRIGATION DISTRICT

A petition for the erection of this district consisting of lands in townships 5 and 6, ranges 21, 22, and 23, to the west of Pothole coulee, was last spring submitted to the Minister of Railways and Telephones for Alberta. The intention of the landowners was to obtain water from St. Mary river through the canal system of the Alberta Railway and Irrigation Company. It was necessary, however, before further action could be taken, to investigate certain lands in townships 4 and 5, ranges 22 and 23, west of the 4th meridian, south of the main canal of the Alberta Railway and Irrigation Company, the owners of which were desirous of being included in this district. A survey was accordingly made of these lands, and plans and cost estimate compiled. It was found that a separate supply canal from the works of the Alberta Railway and Irrigation Company's system would be the most economical method of serving the 2,442 irrigable acres in the area. Since this is a self-contained and economical scheme it is probable that a district will be organized independently of the proposed Magrath district and that construction will be commenced within the next year.

PROPOSED RAYMOND DISTRICT

It is proposed to form into a district certain lands in township 6, ranges 19, 20, and 21, under the Raymond-Sterling lateral of the Alberta Railway and Irrigation Company, which require an additional water supply. This would be accomplished under much the same conditions as in the Magrath district. A petition for the formation of the district has been submitted to the Minister of Railways and Telephones of the province.

RETLAW-LOMOND DISTRICT

Preliminary reports of this project which includes townships 10-17, ranges 17-20, west of the 4th meridian, will be found in the annual reports of the department for the years 1914, 1918-19, and 1919-20. During the year 1922-23 plane-table surveys were completed of the project but it was not possible that year to complete plans and cost estimates.

During 1923 designs and cost estimates were completed of alternative schemes to supply lands in the project as follows:—

Water from Oldman river by an extension of the canal system of the Lethbridge Northern Irrigation District.

Water from Bow river by an extension of the canal system of the Canada Land and Irrigation Company.

It is estimated that under the first alternative the total number of acres which can be irrigated is 64,184, while under the second the total acreage is 55,513. The soil throughout the district consists generally of a sandy loam with a subsoil of silt or clay, while soil samples show alkali to be almost non-existent.

Water supply studies have been made of both possible sources of supply, the Oldman and Bow rivers, and, while the former has a greater quantity, still available, it is estimated that with proper storage facilities either stream can provide sufficient water for the project. The total cost per acre, using the Lethbridge Northern Extension, would be about $57.80, while using the Canada Land and Irrigation Company's system would be about $43.41 per acre. In both cases this includes the cost of enlarging existing systems and creating the necessary storage. Largely because of the difference in cost, the Canada Land and Irrigation Company's extension has been considered the better, and plans for this project have recently been approved, and copies supplied to the interested parties.

PROPOSED HIGHWOOD RIVER PROJECT

This project, as designed from plane-table surveys made in 1922, would irrigate 52,000 acres in the vicinity of the town of Champion with water from Highwood river. The total estimated cost was $39.50 per irrigable acre. Estimates are now being prepared for an alternative scheme based on a new point of diversion from the river, which would decrease the construction cost but would eliminate some of the storage facilities. The desirability of this alternative has not yet been determined.

NORTH SASKATCHEWAN PROJECT

This project has been under consideration by the department for several years and has been referred to quite fully in previous reports.

It consists of scattered irrigable areas throughout the 20,000,000-acre block of land lying between Red Deer and Saskatoon, and north of the Red Deer and South Saskatchewan rivers. It is estimated from the preliminary surveys that the irrigable area will total about 1,400,000 acres, with an additional 135,000 south of the South Saskatchewan river. All these lands could be served by diversion from the upper waters of the North Saskatchewan river and its tributaries.

No detail surveys were undertaken in 1923, but a preliminary reconnaissance indicated that by relocating the proposed main canal an additional 200,000 acres might be irrigated along Kneehill, Threehills, and Ghostpine creeks.

The surveys, which have been completed, are purely preliminary, but they indicate that the cost of the works to serve the whole project will be high, and that a considerable reduction in cost per acre might be effected by construction of the western portion of the project only.

SURVEYS

Frenchman River.—The Frenchman river, heading in Cypress lake, township 6, range 26, west of the 3rd meridian and crossing the International Boundary in township 1, range 10, west of the 3rd meridian, is a tributary of Milk river, which under the International Waterways Treaty is subject to a definite division of its flow between Canada and the United States.

In order to determine the area and nature of the lands in Canada which may best be irrigated from Canada's share of the flow a complete plane-table survey of the river valley in Canada was carried out in 1923. In the course of this work 75,000 acres of land were plane-tabled, many soil samples tested and much other information gained. The total length of the river from Cypress lake to the boundary is 280 miles with a total fall in that distance of 776 feet. Studies and designs are now being worked up to show how and where the available water may be best distributed.

Reservoir Reconnaissance.—For the purpose of locating suitable and economical sites for the storage of water in the foot-hills, and continuing the programme of the past few years, a small reconnaissance party spent the season of 1923 in investigating the headwaters of the North Saskatchewan and Red Deer rivers and their tributaries. Owing to the rough and hilly country to be traversed the party used saddle horses and pack-train and considering the conditions under which work was carried on made good progress. Nineteen possible reservoir sites were located and investigated in sufficient detail to prepare approximate estimates of cost.

Reservoir Surveys.—A nine-man party was organized to follow up the reconnaissance party and make detailed surveys of the most suitable reservoir sites discovered. The transport equipment for this party consisted of pack-train and light wagon.

Surveys of the following sites were completed during the season:—

Stony creek—townships 34 and 35, range 6, west 5th meridian.

Raven and Red Deer river junction—townships 34 and 35, ranges 3, 4 and 5, west 5th meridian.

Clearwater River site—township 35, range 10, west 5th meridian.

Stony Creek Site.—In addition to the Burntstick Lake site surveyed in 1922-23 it was found feasible to create another site on the creek in which to store water from the James river. Plans and reports show the combined development including storage and supply canals can be created to store some 80,000 acre-feet at an estimated cost of $8.63 per acre-foot.

Red Deer and Raven River Site.—It was found possible to create a large reservoir in the valleys of the two rivers by means of a dam in Red Deer river. About 152,000 acre-feet of water could be stored here at a cost of approximately $37 per acre-foot.

Clearwater River Site.—A satisfactory storage site was found at the "gap" on Clearwater river, section 2, township 35, range 10, west of the 5th meridian. At this point it is estimated 157,200 acre-feet may be stored at a cost of $15.79 per acre-foot.

ALKALI TEST PLOTS AT MAPLE CREEK, SASKATCHEWAN

As a result of the 1921 surveys for a project to irrigate the Maple Creek flats, test plots were established on the edge of Maple Creek town to determine the effect of irrigation on the somewhat alkaline heavy clay soil of the neighbourhood. The investigations started in 1922 were continued in 1923. From the grass plots good crops were obtained, the Brome grass doing particularly well.

After receiving three irrigations the two wheat plots were cut on August 20, one yielding 20·1 bushels and the other 26·6 bushels per acre. A series of soil samples was obtained to add to the records being kept of changes in alkali content and the position of the salts in the ground as a result of irrigation.

DUTY OF WATER INVESTIGATION FOR 1923

As in former years investigations have been carried on, chiefly at the Brooks experimental station, to determine the duty of water, i.e., the amount required in addition to rainfall, to produce maximum yields under varying conditions of soil, and climate. The climatic conditions at Brooks during 1923, April to September inclusive, were characterized chiefly by added precipitation received during the month of June. Favourable distribution made this precipitation particularly effective. With the exception of certain seed crops, however, the total amount received was inadequate for economic crop production, and where not supplemented by sufficient irrigation, yields obtained were very low. The season, owing chiefly to the amount and distribution of rainfall, was unfavourable for alfalfa seed production.

The total precipitation, April to September inclusive, was 9·49 inches. The mean temperature for the same period 57·35 degrees. The frost-free period for the season was 105 days and the period from the last spring to the first fall killing frost was 127 days. The frost coming early in September ruined much late alfalfa seed.

At the Brooks Farm, the crop rotation schedule adopted some years ago to maintain the fertility of the soil has been continued. The water requirements of wheat were determined under four different conditions of soil fertility:—

(1) As the second crop following three years of alfalfa.
(2) As the third crop following three years of alsike clover.
(3) As the next crop after peas.
(4) As the third crop following two years of grass.

The water requirement of oats was determined under four conditions of soil fertility; barley under three, potatoes under two, and flax under one.

Rotation A.—Alfalfa five years, potatoes, wheat, flax.
" B.—Alsike clover four years, corn, oats, wheat, oats.
" C.—Grass three years, potatoes, barley, wheat.
" D.—Red clover two years, oats, barley.
" E.—Peas, wheat, oats, barley.

By following this schedule it is possible to have, in each year, grain crops (either wheat, oats, or barley) coming immediately after grains or grasses, second year after legumes, and third year after legumes, thus giving an opportunity of securing practical evidence of the fact that a crop growing on a fertile soil requires less water to produce a given yield than if grown upon a soil from which the available plant food has been exhausted by successive cropping without the use of legumes or the addition of organic matter.

A summary of the results shows that the maximum yields obtained on soil of high fertility received total depths of water as follows (in each case "total depth" represents natural rainfall plus irrigation, the average rainfall being 0.79 foot):—

Wheat	57·5	bushels	per acre	2·28	foot depth
Oats	135·0	"	"	1·78	"
Barley	59·2	"	"	2·72	"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alfalfa hay	5·92	tons	"	2·29	"
Grass hay	1·72	"	"	1·49	"
Field corn	7·77	"	"	1·29	"
Peas	34·8	bushels	per acre	1·78	"
[illegible]	[illegible]	"	"	[illegible]	"

FARM DEMONSTRATION WORK

The 1923 programme provided for twelve demonstration plots of approximately five acres each. These were selected at widely separated points and situated as far as possible on well-travelled roads so as to be readily accessible to all the farmers in the neighbourhood. Six plots were developed in the Lethbridge Northern district and three each in the United and Taber districts, the understanding being that the departmental irrigation specialists would lay out the ditches and give advice and instruction as to the irrigating of the crops, while the owner of the land did the necessary work. This method has been found very useful in demonstrating the increased yields which may be obtained by the scientific application of irrigation water.

Unfortunately no water was available on six of the plots, the heavy river floods and subsequent rains causing accidents and other conditions which prevented the running of water in certain of the Lethbridge Northern district and United district canals. On the remaining plots the season's program was carried through in spite of some damage from hail and cutworms.

Drainage

The year 1923-24 marked the fifth of the operations of the Drainage Division of the Reclamation Service in administering the provisions of the Dominion Government Reclamation Act and Drainage Regulations.

These regulations, together with the Reclamation Acts of the provinces of Alberta and Saskatchewan, provide for the reclamation and disposal of Dominion land in these provinces, as follows:—

1. Sale of Dominion land in drainage projects not exceeding 1,280 acres in size and $5,000 in estimated cost to individuals, at a minimum price of $1 per acre, under conditions of drainage.
2. Sale to the provinces of reclaimable Dominion land at a minimum price of $1 per acre to facilitate the construction and improvement of public highways.
3. Sale to the provinces at a minimum price of $1 per acre of Dominion land in drainage districts organized under the provisions of the Drainage Acts of the provinces.
4. Construction of drainage works by the Dominion Government where not less than one-half the area affected is vacant Dominion land.

During the season 1923-24, forty-nine private drainage schemes under Class 1 were inspected and investigated in Alberta and Saskatchewan. Under Class 3, fifteen drainage projects organized under the laws of Alberta and Saskatchewan were inspected, and under Class 4 the field surveys and investigations of the large Carrot River Triangle drainage project in northern Saskatchewan and Manitoba were completed.

No new large drainage projects in Class 4 were investigated during last year. The work was entirely confined to completing the construction of the Waterhen Drainage district and the investigations of the Carrot River Triangle project, and is briefly outlined as follows:—

WATERHEN LAKE DRAINAGE PROJECT

This drainage district, comprising 13,900 acres, is situated in the Carrot River valley about four miles south of Kinistino, Saskatchewan, in townships 44, 45A, and 45, ranges 21 and 22, west 2nd meridian. It was commenced in 1921 and the main ditches were completed in the fall of 1922. The water was let off from Waterhen lake on the 13th July, 1922, and the lake bed was completely unwatered by August 14 of the same year.

During last season the remainder of the drainage works was constructed. In this connection 4,770 rods of lateral ditches were completed, all openings in the levees of the main canals were filled and extension levees were built at the west end of the district. Four automatic gates to control spring run-off in the various ditches and canals were installed in concrete end walls. Four 24-inch cast-iron culverts were placed on road allowances affected by the drainage works, two additional 40-foot wooden highway traffic bridges were built over the lake canal, and the hold-up gate at the commencement of the marsh canal was constructed to control the waters of Salt Lake reservoir and provide flood protection.

The surveys to delineate the land required to be purchased from private owners for right of way of the drainage works were completed last January. Subdivision surveys of the reclaimed land in the district were carried out last summer by the Topographical Surveys Branch of this department and the necessary land monuments were placed in position.

An experimental plot was operated on the reclaimed land in Waterhen marsh during last season with the view of ascertaining what could be grown best on land of this character. The University of Saskatchewan kindly co-operated with the department in the matter. The resulting heavy crops of cultivated grasses, oats, and barley clearly demonstrated the suitability of the land for agricultural purposes.

Tests made at frequent intervals last season over the entire reclaimed land in the district disclosed that the water table was gradually lowering as the result of drainage. The land affected indicated this, as very noticeable improvements were evident in its condition even in the last few months of the season.

It was decided not to sell any of the reclaimed land at present, but to lease it at a nominal rental for a number of years. The land will thus be brought under cultivation and its agricultural value demonstrated before it is offered for sale at public auction. Following this, practically all the Dominion land in Waterhen lake proper is now under lease. The Dominion land in Waterhen marsh will be similarly dealt with in the fall of 1924.

CARROT RIVER TRIANGLE DRAINAGE PROJECT

This project, comprising some 1,400 square miles, is located in the triangle formed by the Saskatchewan and Carrot rivers and the Sipanok channel in northern Manitoba and Saskatchewan, in the vicinity of the town of The Pas.

Last season saw the completion of the field surveys and investigations. As the level of the Saskatchewan river in the spring of 1923 was the highest since 1916, very valuable hydrometric data were obtained from gaugings and measurements made during this stage of the river.

In June the survey parties commenced active field work which continued until December 15, 1923. On the average, sixteen men were engaged on field work during the season; 350 miles of traverse and topography lines, with levels, were run and an area of some 390 square miles investigated, thus completing the investigation of the whole area involved in the project.

With the information obtained in the field in the seasons of 1921, 1922, and 1923, it will now be possible to plan and design a project for the reclamation of the bulk of the area investigated. The matter of preparing final plans, estimates of cost, and a full report of the project is now in the hands of the engineers who carried out the investigations.

83305—12—10

SMALL DRAINAGE PROJECTS

During the season forty-nine small drainage projects under Class 1 were investigated or inspected in the provinces of Alberta and Saskatchewan. At the present time there are about 12,000 acres of low lands included in these small projects. The average cost of this reclamation is about $8.90 per acre. In the New Sarepta district of Alberta, situated to the south and east of Edmonton, 1,400 tons of hay, valued at $15,000, were obtained from the reclaimed land formerly underlying shallow lakes and marshes in eleven small projects.

PART V

NORTH WEST TERRITORIES AND YUKON BRANCH

REPORT OF THE DIRECTOR, O. S. FINNIE

All matters, with the exception of mining, pertaining to the Department of the Interior and having to do with the Northwest Territories and the Yukon are under the control of this branch, and in addition there is the record of the inspection work done by the mining and petroleum engineers in the Prairie Provinces, British Columbia, and the Northwest Territories. This report, therefore, deals with the subjects discussed in the following order: Northwest Territories, Yukon, Mining and Petroleum Inspection.

Northwest Territories

Lands.—Lands in the Northwest Territories are administered under the Dominion Lands Act. During the year 52 applications for settlement lots were dealt with; 31 patents, totalling 759.6 acres were issued. Two applications for leases were received, one of which was approved; the other is still under consideration.

Hospitals.—For the fiscal year, 1923-24, $5,887.50 was expended on the Fort Smith and Simpson hospitals with the following days' treatment and maintenance: Treaty Indians, 9,395 days; indigent whites and half-breeds, 493 days; pay patients, 408 days. Dr. W. A. Richardson was appointed (part time) with jurisdiction over the area between Fort Wrigley and Fort Good Hope and Dr. Bourget over the area surrounding Great Slave lake.

Education.—The sum of $3,000 was included in the 1923-24 estimates for educational purposes. There was devoted to general purposes the sum of $1,000 and the remainder divided among the Church of England and the Roman Catholic schools as follows: Church of England, three day schools at Aklavik, McPherson and Simpson, $200 each, boarding school at Hay River, $400, $1,000; Roman Catholic, day school at Fort Smith, $200; two boarding schools at Providence and Resolution, $400 each, $1,000.

Law and Order.—Trials for the murder of Corporal W. A. Doak, of the Royal Canadian Mounted Police, and of Otto Binder, trader, and the Eskimo Hannak, were held at Herschel before Stipendiary Magistrate L. Dubuc in June, 1923. The accused Alikomiak and Tatamigana were found guilty and sentenced to death. They were hanged at Herschel, February 1, 1924.

For the murder of Robert S. Janes, trader, Ponds Inlet, Noo-kud-lah, the Eskimo, was found guilty before Stipendiary Magistrate L. A. Rivet in August, 1923, and sentenced to 10 years' imprisonment with hard labour in Stoney Mountain penitentiary, Manitoba.

The Royal Canadian Mounted Police established a new post at Pangnirtung, on Cumberland sound, in 1923, and the local headquarters in the Keewatin district has lately been transferred to Chesterfield.

83305—12—10½

Aids to Navigation.—Owing to greatly increased traffic on the waterways of the Mackenzie valley and the use of larger steam and sailing craft, urgent need was felt for aids to navigation and a number of buoys were placed in the channels and land marks along the shore by officers of the Topographical Survey Branch, assisted by members of the staff of this branch.

Wireless Stations.—To establish a complete line of communication between the Arctic coast and civilization, two wireless stations were erected last season at Dawson and Mayo and have functioned well. This year it is expected that stations at Edmonton, Simpson, and Herschel will be operating. Besides the Government and the commercial aspects of wireless in the districts indicated, the system will be of great value to those engaged in fur trading and development work in the whole of the western part of the Northwest Territories and in the Yukon, and will in addition to assisting in police supervision add to the efficiency of the Dominion Meteorological service. When these stations are completed, Dawson and Mayo will be in communication by wireless with the outside world via Simpson.

Ports and Post Offices.—Because of increased travel and trade in the district of Franklin on the east and in the Mackenzie valley and the Arctic coast to the west, a number of changes were made looking toward more efficient administration. Customs ports were opened at Ponds Inlet and Craig Harbour. Herschel was made a customs port and also a port of entry under the Immigration Act. Officers of the branch were appointed on the recommendation of the Secretary of State to receive applications for naturalization, and the Post Office Department was requested to appoint postmasters at Chesterfield Inlet and at Pangnirtung in Cumberland sound, in addition to those at Aklavik in the Mackenzie delta and Craig Harbour on Ellesmere island. The branch also acted for the Department of Finance in collecting the Federal income tax in the Territories.

Liquor Permits.—The annual return up to December 31, 1923, which was laid before Parliament in compliance with section 88, chapter 62, R.S.C. 1906, shows the number of permits issued by the commissioner to import liquor into the Territories for medical purposes to have been 134, covering 319½ gallons, including 60 gallons of sacramental wine. The Right Reverend Bishop Gabriel Breynat, O.M.I., Vicar Apostolic of Mackenzie, was given special authority under section 86 to manufacture wine and liquor for sacramental and medicinal purposes.

Specimens of Native Handiwork.—The increase in tourist traffic, due largely to extensive advertising by the transportation companies, has created a great demand for curios, souvenirs, and archæological specimens. This, added to the introduction of firearms and modern cooking utensils of the white man, has already caused a scarcity in the corresponding native articles. It is deemed advisable to secure specimens of such before they entirely disappear. A small collection has been made and is now on view in the North West Territories Branch. It is intended that this collection shall eventually be transferred to the National Museum.

EXPEDITION TO THE ARCTIC ARCHIPELAGO

For administration purposes, such as inspection of posts, making exploratory and other surveys, observing the health of the natives and preserving law and order, an expedition was again made to the Franklin district in 1923. Mr. J. D. Craig was officer in charge, with Capt. J. E. Bernier in command of the C.G.S. *Arctic* in which the expedition sailed from the port of Quebec on July 9. The ship carried a stipendiary magistrate, two attorneys, a clerk of the court, and

an interpreter to Ponds Inlet to conduct the trial of the three Eskimos charged with the murder of the Newfoundland trader, R. S. Janes. The *Arctic* also carried officials representing the Victoria Memorial Museum, the Topographical Surveys Branch, an exploratory engineer from the North West Territories Branch, a Geodetic Survey party, a hydrographer from the Department of Marine and Fisheries, a medical officer, relieving members of the Royal Canadian Mounted Police, the secretary of the officer in charge, and cinematograph and wireless operators. An accident shortly after leaving Quebec resulted in the loss of life of the third officer and of the secretary of the officer in charge while attempting the rescue of the former, which cast a gloom over the party for days.

Greenland Visited.—After landing a geodetic survey party at Gready Harbour, on the Labrador coast, and touching at Godhavn, Greenland, where there was an exchange of courtesies with the Danish Government officials and the officers of the inspection ship *Islands Falk* of the Royal Danish navy, the ship reached Craig Harbour on August 6. Proceeding northward, Dr. MacMillan, the United States explorer, was met with at Etah, Greenland. An attempt was then made to reach cape Sabine in order to establish a post at that point, but the ice proved to be so thick and heavy that it was impossible to make a landing, and after waiting as long as was deemed prudent for the ice to open, the ship was turned southward to Craig Harbour to land supplies for another year.

Maintenance of Law and Order.—A short trip to Starnes fiord and a call at Dundas harbour were made and also at Erebus harbour where the Union Jack was once more unfurled over the Franklin cenotaph. Calling at Strathcona sound, where an official survey was made of a lot for the Hudson's Bay Company, Ponds Inlet was reached on August 21. After a trip to Button point to collect witnesses, the trial of the three Eskimos was begun on August 25. At the conclusion of the trial the *Arctic* sailed for Pangnirtung in Cumberland sound, where a new post was established and the necessary buildings erected with the assistance of the ship's carpenters.

Results.—After a cruise of 7,250 miles the *Arctic* returned to Quebec on October 4. The more important results of the expedition include:—

The establishment of a police post at Pangnirtung in Cumberland sound, making three posts established to date in the eastern part of Franklin district.

The examination by the medical officer of the expedition of all the natives with whom he came in contact, proved their general health to be good.

The official land surveys of various police post and trading post sites.

The demonstration of the practical value of wireless in the north, showing that any part in the north can be reached at any time.

Complete cinematographic records of the trip for historical and educational purposes.

GAME

Licenses.—The following licenses were issued under the Northwest Game Act for the license year 1922-23:—

Hunting.—Residents, 211; non-resident British, 97; non-resident non-British, 22; total, 330.

Trading.—Residents, 215; non-resident British, 13; non-resident non-British, 1; total, 229.

The revenue from these amounted to $6,922, $1,150 of this being due to the increases in fees for non-resident licenses. Additional revenue was secured by the sale of wolf skins in Montreal, $4,157.20 net; fines under Game Act, $275, the latter bringing the total revenue under the Northwest Game Act to $11,354.20. The wolf pelts were the product of the wolfing expedition undertaken by the branch to preserve the game animals in the various districts.

With each game license the branch is distributing a printed slip asking the co-operation of the public in assisting the Canadian National Parks Branch to complete its banded bird records.

STATEMENT of Game and Fur-bearing animals hunted and trapped and traded and trafficked in the Northwest Territories under Northwest Game licenses issued for the license year 1922-23.

	Hunting	Trading
Fur-bearers—		
Otter	29	114
Beaver	445	4,141
Marten	1,228	9,106
Fisher	181	773
Mink	2,838	11,939
Muskrat	57,783	234,970
Fox, white	3,823	28,760
Fox, blue	3	188
Fox, red	187	7,742
Fox, silver	3	.....
Fox, cross	89	245
Fox, not specified	1	196
Wolves	170	325
Wolverine	29	210
Coyotes	1	27
Lynx	166	679
Skunks	203	136
Ermine	820	3,847
Bear, white	8	65
Bear, black	5	24
Bear, grizzly	1	.....
Bear, not specified	24	519
Big Game—		
Moose	46	46
Caribou	129	993
Mountain sheep	8	.....
Mountain goat	1	.....
Protected Birds—		
Grouse	1,162	.....
Prairie chicken	559	.....
Ptarmigan	663	.....
Wild goose	69	.....
Wild duck	1,959	.....

The total number of skins for which returns were received during the fiscal year was 372,043, as compared with 222,234 in the preceding fiscal year. The total value of the skins recorded is approximately $2,200,000.

Protection of Wood Buffalo.—As stated in the previous report, an area of 10,500 square miles was set aside as a Wood Buffalo park in order to protect the herds, estimated at 1,500 head, in the area. Reports from the park superintendent show that the buffalo are thriving and increasing and that their protection is assured against white trappers. Protection against Treaty Indians is secured by the fact that under the regulations which permit them to hunt other animals in the park their admission to these privileges is conditional upon their observing regulations as to close seasons and the prohibition of the killing of buffalo. The park superintendent has already secured the co-operation of these Indians to the extent that they realize it is in their own interest to see that the park regulations are observed and to report to the wardens any infractions by trappers or others of the laws for the protection of wild life in

the park. The park warden service consists of six men and the District Agent of the North West Territories Branch at Fort Smith occupies the position of park superintendent.

Reindeer Herd.—In August, 1923, the transfer of the reindeer herd from Lobster bay, Quebec, where it had been located for several years, to Anticosti island was successfully carried out under the direction of the Chief of the Wild Life Division. The island presents the advantages of extensive plains carrying moss and other suitable vegetation and being free from wolves and dogs. Under the agreement made the department is relieved of the upkeep and protection of the herd which is assured by the island administration. The reindeer remain the property of the Department of the Interior until by natural increase five times the number transferred to the island are returned. At latest reports the reindeer were doing well in their new environment.

Caribou.—With respect to the large herds of caribou which roam the so-called Barren Grounds in the Arctic and Sub-Arctic regions, in addition to the protection afforded by the Northwest Game Act, an attempt to educate the Eskimo to the danger of wanton slaughter is being carried out. Many of these people read books in their own language in the syllabic character, and suitably written pamphlets have been distributed among the natives of the Franklin district and other booklets are in preparation in the language of the Eskimo of the western Arctic coast. Reports received indicate good effects from this work.

Musk-ox.—In securing necessary data with a view to carrying out the recommendations contained in the report of the Royal Commission on Reindeer and Musk-ox an officer of the branch is spending a year in investigating climatic and vegetation conditions, etc., on Baffin island and on a number of the larger islands in Hudson bay. By a change in the regulations musk-ox will in future be accorded the same protection under the Northwest Game Act as now applies to the wood buffalo. By this regulation no person is allowed to kill or capture these animals at any season of the year except under special permit from the minister.

Game Preserves for Native Hunters.—Although civilization and industrial life are advancing into the north, the natives are still almost wholly dependent for their subsistence upon the wild life of the country. As the natives are the wards of the nation an important duty of the Government is the protection of their interests. In recent years owing to the influx of white trappers into the hunting areas of the Northwest Territories the continuance of the supply of game necessary for the maintenance of the natives has been threatened, and to prevent this danger the Department of the Interior during the past year set aside an area of 241,800 square miles, or about one-fifth of the total of the Northwest Territories, as tracts where only native Indians, Eskimo, and Half-breeds are allowed to hunt and trap. This area is divided into six preserves located in different parts, so as to protect the hunting grounds of the different tribes and bands. To further protect the wild life resources of the Northwest Territories, license fees for hunting and trapping, also for trading and trafficking in furs have been trebled in the case of non-residents, and the probationary period in which non-residents must qualify has been doubled. The importation into the Northwest Territories of automatic rifles and shot-guns has been prohibited.

Destruction of Predatory Animals.—With respect to wolves a bounty of $20 has hitherto been paid, the person killing the wolf being allowed to retain the pelt. Comparatively few wolves were destroyed under this system and changes

in the bounty system are under consideration. As the need for the destruction of these predatory animals was felt to be urgent a new plan was tried, that of employing wolf-hunters at a specified sum in addition to the bounty, the pelts taken to become the property of the department. The two wolfers employed were sent into the district to the east end of Great Slave lake and killed 135 wolves, from which the department secured 110 saleable pelts. These realized in Montreal last February the net price of $4,157.20, while the entire expenses incurred by the employment of the wolfers was $2,231.54. These operations tend to abate the destruction of valuable food animals, one wolf on the average killing about sixty caribou a year.

In February, 1924, the Director and the Chief of the Wild Life Division attended in Ottawa the Conference of Federal and Provincial Game Officials and took part in the discussions in that body looking to the protection and propagation of game animals and bird life.

STATEMENT of revenue collected in the Northwest Territories for the fiscal year 1923-24

Dominion Lands—		
General sales	$ 80 20	
Sundry fees	3 25	
		$ 83 45
Crown Timber—		
Timber dues	7,050 09	
Hay permits	22 25	
Grazing rental	6 00	
		7,078 34
Mining—		
Petroleum	2,352 40	
Coal royalty and fees	105 00	
Mining fees	809 00	
		3,266 40
General—		
Liquor permit fees	$ 261 50	
Fines and forfeitures	365 00	
Trappers licenses	4,995 25	
Traders licenses	1,927 00	
Sale of furs	4,408 21	
Marriage licenses	8 00	
		11,964 96
Total		$ 22,393 15

YUKON TERRITORY

Timber.—One hundred and three (103) permits to cut wood and timber were issued during the year. The quantities of the different kinds of timber cut were as follows: Saw-timber cut under permit, on which dues were paid, 364,666 feet board measure; fuel-wood cut under authority of permit 15,088¾ cords; fuel-wood cut without authority of permit on which seizure dues were paid, 68½ cords; fuel-wood cut on timber berths on which dues were paid, 1,290½ cords.

Coal.—The Five Fingers Coal Company operated their mine at Tantalus Butte and shipped coal to Dawson. The supply was not equal to the demand but the management advise that an adequate supply will be available this year.

Agriculture.—The season of 1923 was favourable for all field crops. The hay and fodder crop, chiefly brome grass and oats cut green, was heavy and put up in excellent condition. The potato crop though of only average yield was of excellent quality. Wheat, barley, and oats gave good returns and matured well. At the Experimental sub-station at Swede Creek, near Dawson, Marquis wheat seeded May 9 matured in ninety days and yielded 30 bushels 41 pounds to the acre; barley ripened in eighty days. Samples of this wheat and barley were sent to the British Empire Exhibition.

Hospitals and Public Health.—The health of the people throughout the year has been good. The hospitals at Whitehorse, Dawson, and Mayo gave excellent service. The number of aged indigents, both men and women, is increasing each year and their maintenance is becoming a serious drain on the finances of the territory.

Education.—The number of children attending school was greater than in the previous year. Public schools were maintained at Dawson, Whitehorse, and Mayo and high schools at Dawson and Whitehorse. An assisted school was opened at Carcross.

Game.—Big game is reported plentiful, but as wolves are seemingly on the increase, and therefore a menace to game, the Yukon Council adopted plans looking to the destruction of as many as possible of these predatory animals.

Law and Order.—Law and order were maintained as usual throughout the territory, the Royal Canadian Mounted Police rendering their customary efficient service.

The Yukon Council.—The council was in session from May 22 to June 29. In addition to dealing with the routine business of the year, a new Succession Duties Ordinance was prepared and enacted and amendments made to a number of other ordinances.

Mining and Petroleum Inspection

COAL MINING

During the year the majority of the coal mines on Dominion lands in Saskatchewan and Alberta were inspected and reports furnished; besides which a number of special investigations and surveys were made in connection with conflicting locations staked in unsurveyed territory, surface rights, and royalty shortage. When considered advisable, and also at the request of the lessee, channel samples were taken and forwarded to the Department of Mines for analysis.

The following table compares the output for the past two years from Dominion lands and School lands, subject to royalty; also from lands not subject to royalty.

Province	Calendar Year	Output Subject to Royalty		Not subject to Royalty	Total
		Dominion Lands	School Lands		
		tons	tons	tons	tons
Alberta	1922	3,485,920	200,306	2,290,206	5,976,432
Alberta	1923	3,680,768	311,679	2,874,476	6,866,923
Saskatchewan	1922	48,760	48,491	285,186	382,437
Saskatchewan	1923	27,257	70,065	362,848	460,170

The schedule below shows the number of mines subject to royalty and those not subject to royalty; also the total operated.

Province	Calendar Year	Number of Operating Coal Mines		Not subject to Royalty	Total
		Subject to Royalty			
		Dominion Lands	School Lands		
		No.	No.	No.	No.
Alberta	1922	236	24	119	379
Alberta	1923	220	25	117	362
Saskatchewan	1922	50	10	20	80
Saskatchewan	1923	66	10	24	100

Alberta

Steam-coal.—The principal producing steam-coal mines are located as follows: (1) Crowsnest Pass (2) Rocky Mountain Park-Canmore-Bankhead area (3) Brazeau-Mountain Park-Coalspur-Brûlé area.

The possible extension of the market for Alberta coal to the Pacific coast has attracted attention to the Castle River coal area—the southerly extension of the Frank-Blairmore field—and it is proposed to construct a railway from Burmis to the Carbon Hill properties on the west branch of the Castle river. This would open up a large area of easily mined coal.

A considerable amount of prospecting by diamond drilling was done in the vicinity of Leyland in the Cadomin-Luscar coal basin and in the Medicine Lake district, 22 miles southwest of Lovett.

The proposal to connect the Grande Prairie district with a railway running from the main line of the Canadian National Railways at a point near Brulé lake has attracted attention to the possibilities of developing the extensive high-grade bituminous coal areas lying adjacent to those districts.

Although the heavy cereal crops in the West tended to increase the consumption of coal, nevertheless the majority of the mines worked spasmodically during the year. The possibility of an extended strike on the expiration on April 1, 1924, of the agreement between the operators and the United Mine Workers of District 18, also affected the output.

Domestic Coal.—The principal mines of domestic coal are in the following areas: (1) Lethbridge-Taber, (2) Drumheller-Carbon, (3) Three-Hills-Ardley, (4) Saunders, (5) Edmonton, (6) Wabamun.

Considerable changes have taken place in the ownership and organization of mines in the Lethbridge-Taber district but for the most part the new ownership has been accompanied by improvement in equipment and increase in production. Proposed railway extensions in the Drumheller, Saunders, and Wabamun fields if carried out would materially extend the area of operations. There has been activity in the field west of Carbon and considerable prospecting by diamond drill has been carried on. The introduction of natural gas from the Viking field for use in Edmonton has reduced the local market for coal.

Considerable prospecting was carried out south of Wabamun lake by means of test pits with the intention of opening up a stripping mine, the product to be used for the generation of electric energy for consumption in Edmonton and vicinity.

The smaller mines throughout the province of Alberta have operated irregularly during the year. In spite of an abundant crop, farmers and others exercised more economy in the use of coal, and were assisted by the mild weather which prevailed during the greater portion of the fall and winter, besides which, owing to the large number of small wagon mines now in operation, the available supply was in excess of the demand.

Saskatchewan

During the year, 126 inspections of mines were made being an average of nearly two inspections per mine operated on Dominion lands. Forty-four surveys or extensions of mine plans were made, four of these being initial surveys. Several new small mines were opened at points remote from the railway.

There was a decided improvement in the adherence to the Coal Mining Regulations and in the mining methods adopted by the smaller operators, as a result of the advice and assistance given from time to time by the inspector. The public consult the Estevan office freely on all matters associated with mining in the province of Saskatchewan.

The coal trade generally was brisk, the total output for the province for the year, January 1 to December 31, 1923, was 460,170 tons; an increase of 77,733 tons over the previous year. No labour disturbances were experienced in this field.

PETROLEUM AND NATURAL GAS

During the year inspections were made of all drilling operations carried on in the province of Alberta, and also in the Fraser delta of British Columbia, northern Saskatchewan, and several districts in Manitoba.

Besides the inspectional work, plans were drawn up for the repairing of defective wells, and advice given to operators in regard to the different phases of their work. Many graphic logs were drawn, and a graphic log form was designed for the use of operators and the inspection staff. An inspection report form was compiled for use in inspecting wells and a graph of the various sizes and weights of oil well casing and drive pipe. It is expected that these graphs will be very useful to the operators in assembling their strings of casing, and may assist in preventing some errors in this work that have been made in the past. The department's mudding equipment is now being used by the Victory Oil Company on their well at Peace River.

TABLE A.—Summary of Drilling Operations during the Fiscal Year

	Alberta	Saskatchewan	Manitoba	British Columbia	North-west Territories
Drilling commenced	20		2		1
Drilling	34	2	6	5	3
Encountered gas	13				
Encountered oil	2				
Producing gas	85	(approximately)			
Producing oil	7				1
Taking gasolene from gas	5				
Suspended operations	19		1		1
Abandoned	5	1			
Drilling at end of year	6	1			

The majority of drilling operations are usually closed down for the winter, which accounts for the small number of rigs that are actively drilling at the present time. However, besides several wells resuming work shortly it is expected a number of new boreholes will be started this spring.

TABLE B—Production and Sale of Natural Gas in Alberta

	Domestic	Industrial	Total
	cubic feet	cubic feet	cubic feet
Canadian Western Natural Gas, Light, Heat and Power Company	1,893,120,000	72,563,000	1,965,575,000
Royalite Oil Company			1,111,476,000
Northwestern Utilities	47,412,400	967,600	48,380,000
City of Medicine Hat	427,927,000	932,191,000	1,360,118,000
Used industrially from privately owned wells (estimated)		639,882,000	639,882,000

A resume of the drilling operations follows:—

Alberta

Peace River Field.—The Canadian Petroleums have continued drilling operations on their well No. 2, located on section 11, township 85, range 21, west of the 5th meridian, reaching a depth of 2,700 feet, when last inspected.

A well was started for the Peace River Oil Company on section 24, township 85, range 21, west of the 5th meridian, which reached a depth of 305 feet, when drilling operations were suspended.

The Victory Oil Company have resumed operations on their well located on section 31, township 83, range 21, west of the 5th meridian. It is their intention to lower the 10-inch casing to the bottom of the hole and cement it before drilling farther.

Pouce Coupe Well.—The Northwest Company's Pouce Coupe well drilled on section 26, township 80, range 13, west of the 6th meridian, was abandoned as an oil prospect at 3,057 feet. A production of about 10,000,000 cubic feet of gas per day was encountered, and a valve has been placed on top of the well to control this flow of gas.

Coalspur.—The Northwest Company drilled a well on section 3, township 49, range 21, west of the 5th meridian, near the Coalspur station. The well was abandoned at a depth of 1,490 feet.

Birch Lake Well.—The United Dominion Petroleums, Limited, deepened their well on section 14, township 50, range 12, west of the 4th meridian, to 2,410 feet, encountering a flow of water at this depth. An endeavour was then made to plug off this water with cement to allow testing out the oil showing encountered at 2,018 feet. This work was not completed, however, when drilling operations were suspended for the winter.

Viking Field.—This year the Northwestern Utilities took over the wells drilled by the Northern Alberta Natural Gas and Development Company, and after securing a franchise from the city of Edmonton, laid a pipe line from the wells to that city and is now supplying it with gas. The line is composed of 40 miles of $11\frac{1}{2}$-inch pipe and 37 miles of $10\frac{1}{4}$-inch pipe. About 1,100 services have been installed in the city so far. The amount of gas supplied by the company is given in Table B above.

Wainwright Field.—The Northwest Company drilled a well known as the "Imperial Gratton No. 2," on section 14, township 45, range 8, west of the 4th meridian, to a depth of 2,010 feet, but as neither oil or gas was encountered in commercial quantity, the well was abandoned.

The British Petroleums, Limited, obtained a flow of gas, which they estimated at about 2,000,000 cubic feet in their No. 1 well drilled on section 36, township 45, range 7, west of the 4th meridian. It is reported that the gas has a gasolene content of $2\frac{1}{2}$ gallons per 1,000 cubic feet. The rotary mud was replaced in the well before this department had an opportunity to make any tests of the gas as to volume, pressure, or gasolene content.

In the British Petroleums No. 2 well on section 30, township 45, range 6, west of the 4th meridian, some heavy asphaltic based oil was encountered, the specific gravity of which is about 12° Be. Various estimates of the possible production have been made, but no authentic information on which to base an estimate has come to hand. On account of the strike of oil in this well it is expected there will be considerable drilling activity in the field this year.

Craigmyle District.—Near Craigmyle the Prairie Natural Gas Company cleaned out a well drilled some years ago on section 36, township 32, range 17, west of the 4th meridian, and drilled a second well on the same location to a depth of 477 feet. A small production of gas was obtained.

Mutual Oil and Gas Development Well.—The Mutual Oil and Gas Development Company, drilling on section 14, township 47, range 27, west of the 4th meridian, have reached a depth of 1,175 feet, a small amount of gas being encountered at 370 feet.

Turner Valley Field.—The Royalite Oil Company has drilled its No. 4 well on section 7, township 20, range 2, west of the 5th meridian, to a depth of 3,175 feet, encountering several flows of gas which amount to between 5,000,000 and 7,000,000 cubic feet per day. Although no tests of the gas were made it is reported that it is fairly rich in gasolene. A very small amount of light oil was also encountered. Drilling operations were suspended in the fall to allow this gas to be passed through the gasolene absorption plant and then turned into the gas line to supply the city of Calgary. The production is given in Table B above.

The Royalite Oil Company is also securing gas from their wells Nos. 1, 2 and 3 on section 6, township 20, range 2, west of the 5th meridian, and on account of the much larger supply of gas this year, have added six more compressors for boosting the pressure of the gas before putting it in the line.

At the Illinois Alberta Oil Company's well on section 12, township 20, range 3, west of the 5th meridian, an absorption plant was erected to remove the gasolene from the gas. A production of gasolene of about 500 gallons per day is now being obtained. Some of the residue gas is being used to drill the McLeod Oil Company's well and to heat and light some nearby houses.

The McLeod Oil Company commenced drilling last summer on section 1, township 20, range 3, west of the 5th meridian, and have reached a depth of about 1,250 feet.

Monitor Field.—The West Regent Oil and Gas Company deepened their well drilled on section 19, township 34, range 4, west of the 5th meridian to about 3,500 feet. Operations were suspended in the fall but will probably be resumed in the spring.

Village of Suffield.—The village of Suffield drilled a well on section 34, township 14, range 9, west of the 4th meridian, to a depth of 715 feet, but suspended operations early in the summer.

Many Island Lake District.—The Many Island Oil and Gas Company's "Drazen No. 1" well, on section 34, township 12, range 2, west of the 4th meridian, was drilled to a depth of 1,476 feet, when operations were suspended in December last. Gas flows were encountered at 795, 1,220, 1,275, and 1,427 feet, in all amounting to about 250,000 cubic feet per day. The gas has been cased off. Drilling operations were resumed on March 15, 1924.

The well of the Canadian American Oil Company on section 31, township 13, range 1, west of the 4th meridian, was drilled to a depth of 1,315 feet, a flow of gas acounting to about 750,000 cubic feet per day being encountered. Drilling is suspended at the present time.

The Community Oil Company's well on section 19, township 4, range 1, west of the 4th meridian, was drilled to a depth of 2,350 feet. The rotary equipment was then found too light for deeper drilling and standard equipment was substituted. Some gas obtained at 1,500 feet. Operations are suspended at the present.

The Medicine Hat Petroleum Company's well No. 2 on section 14, township 11, range 6, west of the 4th meridian, reached a depth of 775 feet when drilling was suspended in the fall. The company intends to resume operations shortly.

Chin Coulee Field.—The Canadian Western Natural Gas, Light, Heat and Power Company drilled two wells in this vicinity—No. 7 on section 32, township 9, range 17, west of the 4th meridian, to a depth of 2,183 feet, securing small production of gas, and No. 8 on section 29, township 9, range 17, west of the 4th meridian, to a depth of 2,470 feet without encountering a production.

Foremost Field.—The Canadian Western Natural Gas, Light, Heat and Power Company drilled three wells in this field. No. 1 on section 1, township 6, range 11, west of the 4th meridian, encountered a flow of gas which measured 17,000,000 cubic feet per day, with a rock pressure of 660 pounds. No 2 on section 29, township 5, range 10, west of the 4th meridian, secured a flow of gas amounting to 7,500,000 cubic feet per 24 hours, and No. 3 on section 30, township 5, range 11, west of the 4th meridian, a flow of about 2,500,000 cubic feet. It is reported that the company intend this coming summer to lay a pipe line from these wells to their main gas line.

Sanctuary Well.—The Thompson Oil Company has drilled a well on section 10, township 5, range 8, west of the 4th meridian, to a depth of 2,620 feet, and operations are in progress.

Canadian Oil and Refining Company's Well.—The well being drilled by the Canadian Oil and Refining Company, on section 29, township 1, range 11, west of the 4th meridian, has reached a depth of 2,200 feet.

Border Field.—The Border Oil Company, last summer, deepened the diamond drill hole on section 6, township 1, range 14, west of the 4th meridian, to 2,000 feet, but suspended operations early in the season.

The Boundary Oil Company drilled on section 3, township 1, range 15, west of the 4th meridian, and suspended operations at 670 feet.

The Anglo-Indian Oil Company drilling on section 14, township 1, range 15, west of the 4th meridian, suspended operations at 225 feet.

The J. F. Moodie "Dundas No. 1" well, on section 4, township 1, range 15, west of the 4th meridian, was drilled to 1,360 feet when operations were suspended. Small showings of gas were encountered.

The Oil Lands Exploration Company's well on section 2, township 1, range 15, west of the 4th meridian, was suspended at 200 feet.

The Coutts-Sweetgrass Oil Company suspended operations on their well drilled on section 1, township 1, range 15, west of the 4th meridian, at 2,840 feet. Good showings of oil were encountered in this well, but they were drowned out by large flows of water.

The Northwest Company's "Red Coulee No. 1" well, on section 5, township 1, range 16, west of the 4th meridian, was drilled to 2,540 feet. Some oil was encountered but water found immediately below it drowned out the oil, and the well was plugged and abandoned.

Willow Creek.—The Northwest Company's Willow Creek well, on section 29, township 14, range 2, west of the 5th meridian, was abandoned at 3,602 feet.

Northwest Territories

The Northwest Company carried on operations on three wells near Fort Norman on the Mackenzie river.

"The Discovery Well" on Lease No. 11491 was deepened to 1,025 feet, the flow of oil being increased to about 100 barrels per day.

The well on Bear island, known as "Camp D" was drilled to 2,304 feet, only a small showing of oil being encountered.

The "Camp C" or "Link Location" well was drilled to 3,057 feet, without encountering oil.

Manitoba

The Northern Manitoba Oil and Gas Company abandoned their well No. 2 on section 33, township 42, range 26, west of the Principal Meridian, at a depth of 996 feet, and have erected a rig in preparation for drilling their No. 3 well located on the same section.

The Porcupine Mountain Oil and Gas Company have abandoned their No. 1 well on section 33, township 42, range 26, west of the Principal Meridian, at 300 feet. The latest information is that they were drilling at 640 feet on their well No. 2.

The Stony Mountain Oil and Gas Company abandoned their well on section 29, township 2, east of the Principal Meridian, at 1,009 feet, and were operating a diamond drilling equipment at 1,141 feet on a nearby location, which is not on Dominion lands.

Publications of North West Territories and Yukon Branch

During the year the following publications were issued:—

Canada's Arctic Islands.
Canada's Wild Buffalo.
Local Conditions in the Mackenzie District.
Mining Conditions in the Mackenzie District.
Map of the Northwest Territories.
Game Law Posters.
Folders and Posters for the Protection of Caribou.